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and
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Christos T. SOTIRELIS

EUROPEAN DEREGULATION

**ANALYSIS OF THE FUTURE
OF EUROPEAN LOW COST CARRIERS**

Supervisor

Dr. C. H. Friend

SEPTEMBER 2001

THESIS CONTAINS

CD :

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ABSTRACT

The appearance of low cost scheduled airlines in Europe, operating with the same philosophy of low fares, 'no-frills' and high frequency service to that of Southwest airlines has been the main departure from the existing market 'status quo'. After a 6-year period which saw such airlines becoming more numerous and gaining wider acceptance from the public, this study tries to investigate whether they will have an assured future and, if so, what form this will take.

The investigation is in two parts. In the first part the background environment is investigated in terms of the policy application, the industry infrastructure and the economic conditions prevalent in the past years as well as currently. Additionally, comparisons of the differences between the approaches to deregulation of the US and the EU policy makers are analysed, hence their repercussions on the low cost carrier market are examined.

In the second part, a model was thus developed to simulate the direct costs of operations of a low cost airline. The model provided information about the cost per distance flown for an airline flying on a given route. Following that a number of routes were surveyed to find the aircraft costs per sector of flying each route so that a fully costed route portfolio was available. In the next stage an airline intra-European scheduled operation was created using a small number of aircraft with two different schedule types: a typical low cost high frequency operation and one reflecting a full cost, business and leisure traffic mix. Comparisons of the overall performances between the two schedules were carried out. Subsequent to that, 381 European routes grouped as scheduled, charter and domestic were used to apply the derived data to check their suitability for entry by the low cost carrier.

The results obtained clearly demonstrate the increased operational efficiency of the low cost type of schedules. Growth will continue as the low cost formula makes considerable inroads to existing markets. Secondly, the future route entry opportunities are to be found with many monopoly or duopoly city pairs currently under-served, provided airport access is assured.

The biggest opportunities though are with a large number of leisure routes served by charter carriers, as they fit both the low cost airline passenger profile as well as the airline's requirements. Finally, the domestic routes were all served too intensively to make them viable for entry.

Index of Abbreviations

A.A.	American Airlines
A.D.A.	U.S. Airline Deregulation Act
A.E.A.	Association of European Airlines
A.S.A	Air Services Agreement
A.S.K.	Available Seat Kilometers
A.S.M.	Available Seat Miles
A.T.A.	U.S. Air Transport Association
A.T.K.	Available Tonne Kilometers
B.A.	British Airways
B.A.A.	British Airports Authority
B.P.R.	Engine By Pass Ratio
B.W.I.	Baltimore-Washington International Airport
bmi	British Midland airlines
C.A.A.	U.K. Civil Aviation Authority
C.A.B.	U.S. Civil Aeronautics Board (to 1986)
C.R.S.	Computer Reservations Systems
D.A.L.	Delta Air Lines
D.C.A.	Washington DC National Airport
D.E.T.R.	U.K. Department of Environment, Transport and the Regions
D.O.C	Direct Operating Costs
D.o.J.	U.S. Department of Justice
D.o.T.	U.S. Department of Transportation
D.T.L.R.	U.K. Department of Transport, Local Government and the Regions
E.C.A.C.	European Civil Aviation Conference
E.E.C.	European Economic Community (pre-1992)
E.U.	European Union (post 1992)
E.U.C.	European Union Commission
F.A.A.	U.S. Federal Aviation Administration
F.F.P.	Frequent Flyer Program
G.D.P.	Gross Domestic Product
I.A.D.	Washington DC Dulles Int'l. Airport
I.A.T.A.	International Air Transport Association

I.C.A.O.	International Civil Aviation Organisation
I.C.P.	International Connecting Points
I.L.G.	International Leisure Group
I.O.C.	Indirect Operating Costs
J.F.K.	John F. Kennedy airport
L.A.X.	Los Angeles International airport
L.C.C.	Low Cost Carrier
L.F.	Load Factor
N.R.C.	U.S. National Research Council
O.A.G.	Official Airline Guides
O.A.P.	Overall Air Pressure Ratio
O.E.C.D.	Organisation for Economic Co-operation and Development
O-D	Origin - Destination city pair
R.O.I.	Return on Investment
R.P.K.	Revenue Passenger Kilometers
R.P.M.	Revenue Passenger Miles
R.T.K.	Revenue Tonne Kilometers
R.T.M.	Revenue Tonne Miles
S.F.O.	San Francisco Intl. Airport
S.L.C.	Scheduled Low Cost carrier
S.W.A.	Southwest Airlines
T.A.P.	TAP - Air Portugal
T.R.B.	U.S. Transport Research Board
T.W.A.	Trans World Airlines
U.A.L.	United Air Lines
v.f.r.	Visiting Friends and Relatives

Index of Disk Files

AEA STATS	Statistical Series data on AEA airlines, historical and current.
ATA FARES	Historical and current data on US fares, yield, profitability, earnings and delays
FLEET 2DD	Design data for block costs of all a/c types, block analysis, route costings per type, OAG route data
IATA & Forecasts:	Data and forecasts from IATA, Boeing, Airbus Eurocontrol, ECAC,
NEW ENTRANTS	Data on US hubs, dominance, constrained fares, and industry concentration.
SCHEDULES	All schedule analysis, formulation, for both types, sensitivities, route survey, route compatibility assessment
UK Airlines 2000:	UK Airline data from CAA
UK Airports 2000:	UK Airport data from CAA
UK L.C.C.s:	Fares, Operational analysis, of all UK L.C.C.s. UK Forecast 2000, Sensitivity analysis in forecast 2000
US DEREG	Data on early deregulation figures and current situation.
US – EU	Comparison data for US/EU/World carriers

To

My father and mother, uncle Vangelis, and Stathis,
who did not have the chance to see this.

PART I

PART I

1 INTRODUCTION

In the new unified Single Internal market composed of 325 million people transportation services play a fundamental role in the European Union's economic development. The free movement of goods and passengers is a prerequisite to establishing an economy of scale. A market cannot be considered fully integrated if transportation costs remain so high that businesses cannot afford to ship commodities across member states' borders. Unless they decreased, deregulation of the industry would remain a purely theoretical prospect. Until recently the transportation industry has been highly regulated with central control being exercised through dependence on government subsidies. This has fostered a fragmented economy which is estimated to increase the cost of transporting goods by up to 10 percent and decreases business profits by up to \$30 billion a year. Delays at border crossings for customs controls amounted of up to 40 percent of the total trip time. Air carriers offer higher speeds and avoid border-crossing controls, but are only competitive over and above 300 km trips.

Many factors have affected why liberalisation took place in Europe. The main ones are the observations of the benefits of the U.S. deregulation, mainly in the reduction of the cost of air travel for the consumer and the need to provide a more efficient transport industry independent of frequent financial support from the public funds. Various studies were undertaken showing that less regulation or even none at all would be beneficial to the market. Until then the failure of the Community to introduce competition into the scheduled sector

was contrary to the EEC's intended philosophy of portraying that it was creating a People's Europe. Many countries with more liberal points of view and particularly the UK were beginning to liberalise their domestic market and to seek expanded liberalised markets throughout the EEC by adopting more liberal bilateral agreements.

Liberalisation did bring some of the desired effects, although because of the nature of the legislation, the competition policy followed by the EU Commission, the structure of the European market, the infrastructure constraints and barriers as well as the deep recession experienced in the early 1990s it has taken a long time to achieve the desired results. Despite the gradualist method of liberalisation undertaken by the EC, the most interesting development has been the creation and rise to power of the low cost, 'no-frills' carriers, copying the operating philosophy of Southwest Airlines in the U.S. The philosophy of the low cost 'no- frills' airlines is to focus strongly on the provision of a simple transportation product at a significantly lower fare level, than the fares offered by its competitors. Although Southwest was not 'a child of U.S. deregulation' it has nonetheless proved to be one of the most successful and most profitable U.S. airlines of the last 25 years. It is the aim of this thesis to examine the European imitators of Southwest i.e. airlines like Ryanair, EasyJet, Go, and others like them, identify their innovations and show in which areas they can offer an alternative to the established airlines.

Furthermore, it is proposed to project how far this different type of airline philosophy will advance in the market, within the current or foreseeable economic conditions. Hence, to try and discover what their future is likely to be within the EU marketplace.

1.1 *INTERNATIONAL REGULATION OF AIR TRANSPORTATION*

In order to assist the understanding of how deregulation came about one has to briefly examine the basic framework in place and the regulatory regime and some of its aspects that preceded it.

The beginning of the need to bring the air into a legal framework has existed since Roman times. Since then a dispute has existed between the idea existing under Roman law that the air was collective property (“*res communis*”) or belonged to the owner of the soil underneath it (“*usque ad coelum*”) as proposed by English law. During the nineteenth century the idea of air as a commodity was further refined until in 1872 a New York court clarified it to be “...the rule or maxim giving the right of ownership to everything above the surface to the owner of the soil has full effect without extending it to anything entirely disconnected with or detached from the soil itself”.¹ As air navigation became possible, freedom of the air inspired by the doctrine of the “free sea” clashed during the 1912 Paris Conference of the International Law Association with the philosophy held by some, that social and national interests were at stake and States should exercise and maintain their sovereignty which they were able to control, as part of their territory. This confrontation was eventually solved through compromise a year later in Madrid² by those who recognised that national interests were closely linked to an emerging civil aviation. Then at the Paris Convention of 1919³ and with the hindsight of the

¹ Hoffman vs. Armstrong cf. A. McNair op.cit. p.33.

² International Law Association, 28th Report, Madrid, 1913

³ Convention relating to the Regulation of Aerial Navigation, Paris, October 13, 1919; ratified by 32 countries.

First World War the notion of national sovereignty was transformed from an almost exalted spiritual value to the cornerstone of the regulatory system for international air services. This remained unchanged until near the end of the Second World War.

1.1.1 The establishment of the regulatory background

At the same time in 1944 as General von Rundstedt was launching his Ardennes offensive in WW II, state representatives were convening in Chicago for the Convention on International Civil Aviation⁴ to consider the future of international civil aviation in a world wide perspective. All concerned had already witnessed the destruction caused by aviation during the two World Wars and, particularly, the Americans were eager for aviation to foster the development of peaceful and harmonious relationships amongst all peoples. Among the 56 governments invited to the Convention the United States were in the best position because most of their civil aviation was going to emerge as the strongest, having the greatest capacity and best equipment. Hence their outlook and intentions were to ensure through the Convention “open skies” free of any controls on tariffs, capacity and with the maximum exchange of traffic rights possible around the world, in which their airlines could expand would prevail. Their views were shared by other nations such as the Netherlands or Sweden whose airlines depended on international traffic because their domestic markets were very small. The United Kingdom, which

⁴ Convention International Civil Aviation, Chicago, (the Chicago Convention), December 7, 1944 Cmd 6614 (1945) There are currently over 183 signatories. A UN specialised agency - ICAO - was

was the other big power of that time, together with other European countries, had to take account of their respective industries, which were decimated by the war. They therefore presented a more protectionist attitude calling for the establishment of an International Air Authority to license operators, determine and allocate frequencies, and fix tariffs. American domination achievable through expansion of civil aviation in a liberal multilateral environment was thus blocked.

The most important principle set out was in Article 1 of the Chicago Convention providing that *“every state has complete and exclusive sovereignty over the air space above its territory.”* The principle of “freedom of the air” to allow easy entry to the aviation market was superseded. Apart from the principle described in Article 1, the Convention established a series of other basic principles:

- i. equal rights for all States to participate in the traffic
- ii. the laws and regulations established by a Contracting state must be complied by aircraft of all other Contracting states “without distinction as to nationality” (Art.11)
- iii. all states are free to designate the national companies to operate the Services.
- iv. the scope of the Convention is for the use of civil aircraft (Art 3a,c)
- v. the rights of governments to regulate air navigation above their territory are not absolute but are subject to international regulations. (Art.1)

established as a forum to supervise technical standards for safety and operations and to aid third world countries to set an aviation infrastructure.

vi. a liberal regime was envisaged for non-scheduled flights (Art 5.)
although such flights would have to be authorised.

Although a consensus on a system to exchange the 'freedoms of the air among free nations' was not found, major principles had nevertheless been agreed upon as well as the major institution that would be formed to monitor developments in accordance with the principles agreed. In comparison to today's experiences and standards in international decision making and agreement drafting, the drafting, adoption and opening for signature of one major convention, three agreements, a standard form of bilateral agreement for air routes and the text of twelve draft technical annexes were an awesome result. In parallel with the signature of the Chicago Convention, two other major agreements were signed regulating the nature of the different rights that may be offered to airlines by the States. The International Air Transport Agreement established the "five freedoms of the air" which later on evolved to become eight. These freedoms were concerned with the right of airlines to travel between countries on a commercial basis and to be able to pickup passengers, mail and cargo for onward travel from each country. The first two freedoms were really of technical nature (overflying a territory and landing for refuelling or repairs). The original intentions were that all five freedoms would be granted on a multilateral basis to the signatories. The stumbling block was the granting of the third, fourth and fifth freedoms, which came up against the issues of profitability and viability of the routes operated. Carrying traffic to a third country on a fifth freedom basis had the effects of both increasing the payload for one airline while at the same time removing potential traffic for the country granting fifth freedom. In the end the pursuit of self-interest by all the

participants meant that traffic rights would be exchanged on a bilateral basis.

The Standard Air Services Agreement was drafted to provide a model.

The Chicago Convention was a major achievement because, on the positive side it:

i) established a viable framework for commercial air transport.

ii) established the principles of: equal rights of access to air transport for all nations, sovereignty and limitations of its use, nationality of aircraft.

iii) set up ICAO which would allow the harmonisation of navigation rules, increase co-operation for safety and would provide a neutral forum where aviation experts could share knowledge, confront or exchange views and avoid the pitfalls of international politics.

The compromises made necessary in order to achieve all the above meant that some objectives were not realised and became shortcomings as time went by.

These included:

Absence of positive legislation: there were no specific rules binding the signatory members but instead sets of rules were merely agreed. ICAO was an institution designed to guard the law although the specific law had not been set up.

The wide scope and vast ambitions of the Chicago Convention together with its associated Agreements provided only a framework for bilateral agreements, general regulation on international air navigation and the skeleton of a code of conduct to govern international air transport.

In contrast to the acknowledged agreement for the setting up of technical standards for air navigation, sensitive politico-economic issues remained vague

and proved ineffective at critical times. Hence, States derived authority from other legal instrument described in Article 1 of the Convention and sought little guidance from ICAO. In the long term such legal uncertainty exposed the international regime to tensions.

When in 1984 the Convention celebrated its 40th Anniversary it was called ‘an act of faith in civil aviation’ by the long time chairman of ICAO, Mr Kotaite⁵ and that “ it had met the need in 40 years’ use” ⁶

1.1.2 The application of the Chicago Convention

As mentioned earlier the Chicago Convention was a compromise reached between the two countries whose doctrines conflicted the most. Therefore it seemed that “the two leading aviation powers of the world”⁷ had a duty to endeavour to reconcile their views on the exchange of commercial traffic rights and their modalities. A more conceptual compromise beyond the mere pragmatic arrangement, which they might otherwise have reached, was needed. This led to the signing on February 11, 1946 of the Bermuda Air Services Agreement between the USA and the UK.

⁵ A. Kotaite, ‘The Chicago Convention, An Act of Faith in Civil Aviation’, 39 ICAO Bulletin, Nov 1989, p.14

⁶ Y. Lambert, “ The Chicago Convention has met the need in 40 years’ use”, 30 ICAO Bulletin, Nov. 1984 p.15

⁷ Albert W. Stoffel, “ American Bilateral Air Transport Agreements on the Threshold of the Jet Transport Age”, J.A.L.C., 122 (1959) “ Such an agreement was necessary between the two leading civil aviation powers of the world because of the differences of their approaches to the problem of the exchange of commercial air rights which had become evident in Chicago. The agreement constituted a compromise between the liberal American and the restrictive British concepts.”

The greater bargaining power of the UK, controlling the widest range of cities with which to trade traffic rights on world-wide air routes was counterbalanced by the liberal American philosophy reflected in the capacity clauses and the pricing philosophies of its liberal economists of the time. The main chapters of the agreement can be grouped together in the following areas:

- Definitions of the freedoms of the air.
- General principles on: fair and equal opportunity, etc;
- Capacity clauses
- Air fares and rates clauses
- Legal and administrative clauses
- Definition and allocation of air routes over which the airlines could apply to operate.

This way the foundation of the bilateral exchange of traffic rights became possible and all subsequent agreements would follow this model. The general rules involved governments designating carriers, which, in turn, would supply capacity as they saw fit. Fares would be subject to bilateral government approval and be subsequently fixed. All of this would be done through the machinery of IATA. Due to the way the compromise between bilateralism and multilateralism was formulated, within the Bermuda Agreement most states tended to consider a right of ownership of the traffic originating in their territories. Hence, therein lies the root of the problem that would affect the bilateral regime of regulation and would eventually lead to moves towards its dismantling.

The founding fathers of the international regulatory system did not intend for it to be a totally rigid system, but one with enough built in flexibility that would allow economic and technical developments. As it failed to provide directly for a multilateral exchange of traffic rights, it was left to the Bermuda Agreement plan to provide the illusion that this could be achieved on a voluntary basis by each country. Therefore it was only to be expected that once this framework was subjected to tensions, it would regress to a more restrictive consensus, and national interests would prevail. This would be observed in time within the terms of IATA tariff agreements. Bin Cheng⁸ noted about the Bermuda plan that what had started as an ad hoc and temporary arrangement had now taken the form of ‘ a new skyscape ’ in international law.

One system that the Chicago Convention considered unimportant for regulation was non-scheduled services. In 1944, it mainly consisted of small air-taxi operators, rescue and emergency flights and some cargo. They did not threaten to damage competition. If only they could imagine that this is where the direct comparisons that would undo regulation would come from.

⁸ Bin Cheng *op. cit.*, p.3; Bin Cheng, *The Right to Fly, Grotius Society Transactions, 1956, pt 99, pp.105*

2 REVIEW OF PREVIOUS WORK ON U.S. DEREGULATION

2.1 *INTRODUCTION*

The Airlines Deregulation Act (ADA) of 1978 has been one of the most controversial issues in air transportation. It was brought into existence because as suggested, was creating continuous over-capacity problems, made worse by slackening demand, at a time of economic stagnation, inflationary pressures and increasing fuel expenses [Moore (1986)].

In the 1970s there had always been a variety of opinions about the nature of the U.S. airline industry, [OECD (1988)]. Pro-regulation opinion considered the industry to be either a natural monopoly or oligopolistic which required constant regulation to keep fares at competitive levels. Alternatively, one that it is subject to excessive entry or to the, so called, “cream-skimmers” who will enter the lucrative markets only, thus spoiling the balance for the rest of the cross subsidised regulated marketplace.

The anti-regulation group considered that the threat of entry would force all the carriers to maintain competitive fare levels. The theory was called the contestability theory, was mainly advocated by A. Kahn, a Cornell economics professor, who became chairman of the Civil Aeronautics Board (CAB) and W.Baumol, J.C. Panzar, R.D. Willig (1982) amongst others. The main premise that supported this theory was the assumption that this type of market has no sunk costs which cannot be recovered, thus enabling or even threatening a ‘hit

and run' entry. Subsequently, it has been proven by a variety of studies, reviewed later, that sunk costs do indeed exist creating barriers to entry and hence airline markets are not perfectly contestable. Such barriers include: scarcity in airport slots and gates, computer reservation systems (CRS), economies of scale and scope, and the design or the transformation of airline networks into hub and spoke types which naturally disadvantage any new entrant. Some of these barriers can be said to have been developed by the incumbent carriers as defensive measures since deregulation. Some others are believed to be genuine nation-wide infrastructure problems, which assist the dominance of incumbents.

Its proponents have found little benefits from it while the opponents have found many things to criticise about it. Having the benefit of hindsight and examining the progression of the U.S. deregulated industry several questions are generated. The main question refers to the contestability hypothesis and whether this has been proved to apply to all the markets. If the hypothesis and deregulation in general has not come up to the expectations does it mean that it is flawed or is this failure attributable to other factors? What would be the implications and lessons to be learned by Europe's intention to deregulate? All these are questions that have been asked but no clear answers are available.

With reference to the last question about the inherent nature of air transportation Button (1996) investigates this possibility further for the case of the European liberalisation (see Section 4.2.)

Before the policy of deregulation had gathered enough pace, opinion about its success was divided. Some disagreed fundamentally because they viewed the airline markets as naturally oligopolistic and predicted that this would be the

outcome of any deregulatory attempt. On the other hand its advocates pointed to the much lower intrastate fares (up to 50 percent lower than equivalent interstate markets) where pricing and entry were free. It had been observed that despite high regulated fares the major carriers dissipated their extra returns through service quality competition in the form of frequencies and capacity. On the more dense and concentrated markets this phenomenon was not so apparent as service competition was less and the load factors were higher. Overall the industry showed that even under regulation firms could not co-ordinate their services or collude on capacity and prices to earn excess profits. This proven inability of the airlines to collude would allow competitive forces to shape the markets with reasonable effectiveness.

Since the passing of the ADA in 1979 there followed a rapid flurry of new entry which reduced concentration only by a small margin because most of the new entrants were small in size. In October 1978, Midway Airlines became the first completely new airline in 38 years to be granted a CAB certificate, it was quickly followed by New York Air, Muse, People Express, and several others. Over the next half dozen years, CAB would certify an additional two dozen brand-new airlines and would approve the expansion of many established intrastate and charter carriers. Some of these new airlines entered mainline, short-haul routes, offering non-stop, point-to-point service in markets with high passenger volumes—like New York Air, flying between N.Y. LaGuardia and Washington National. The new operators usually were completely new ventures set up to take advantage of lower costs and more efficient operating characteristics. Some existing intrastate carriers also entered long-haul

markets. Below follows a quick examination of the developments in the most important areas of U.S. deregulation.

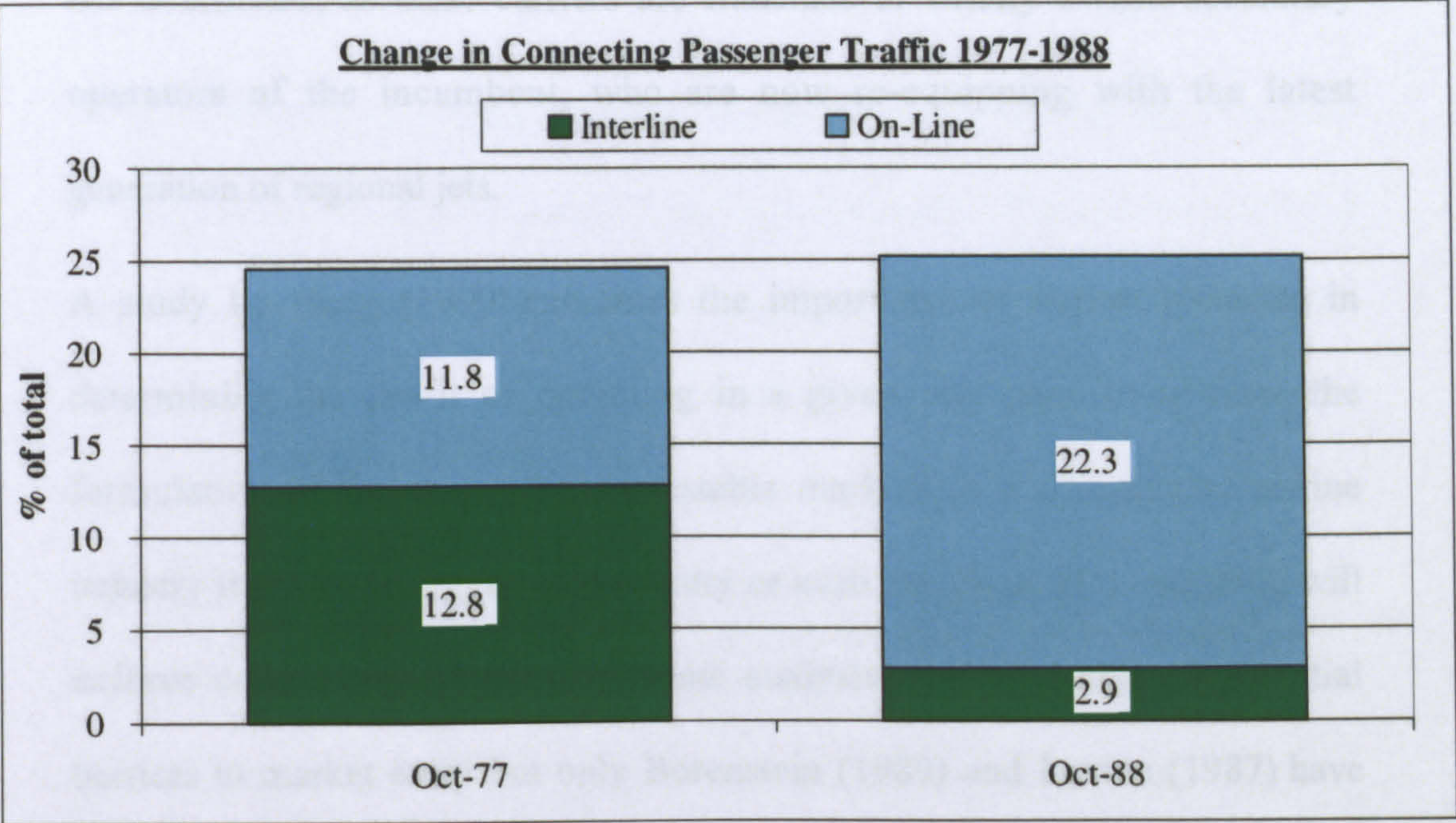
2.2 ROUTES

During the regulation years routes the CAB strictly controlled entry. This created only few opportunities for route entry, which consequently ensured large returns to those who had authorisation. Once the entry and exit of routes was made completely open to all airlines the airline networks changed into a hub and spoke structure. Point to point services declined drastically as traffic from cities was fed through hubs⁹, centralised airports co-ordinated so as to enable onward connections to be made using the same airline. The economic justification for this is termed 'economies of scope' meaning the savings possible when the joint production of two outputs is less than the costs of production of two separate outputs.

The advent of larger wide-bodied aircraft having greater passenger capacity and range has achieved lower costs per seat-mile compared with the narrow-bodies used exclusively in the past. So as the number of passengers on a route increases one would expect the size of the aircraft to increase too and consequently costs should fall. There are limits to this theory however since larger aircraft are unsuitable for use on short haul routes. Studies made by Caves, Christensen and Tretheway (1984) and by Gillen, Oum, and Tretheway (1985) indicate clearly that the corollary from this is that it is not always economical for a carrier to offer non-stop service between all city pairs in the

⁹ An air traffic hub is not necessarily an airport. According to the FAA definition 'a hub' is a city and Standard Metropolitan Statistical Areas (SMSAs) requiring aviation services.

network. Instead traffic needs to be channelled through corridors so as to concentrate it, offering the advantages of realising higher economies of density and offering better frequencies. Fig. 2.1 below shows the dramatic effect this restructuring had on travel between this period.



Source: FAA

Fig. 2.1: Hubbing Connections

The exclusion of interlining traffic at the same hub pre-empts competition on a route level, transferring it to the network level. Furthermore the number of carriers in a system might be limited by the combination of economies of density and economies of route integration, also known as economies of scope, because several extra benefits are realised by serving numerous city pairs through the same hub. Going one step further, if consideration is given to the assumption that a network can only support a certain number of carriers, once these hubs have been established and are working then they will act as ‘traffic siphons’ and will make it extremely difficult for a new carrier which is not

established in such a way to enter the market served by an incumbent. Conversely at the same time non stop service between non hub cities and small hubs declined or has been relegated to smaller feeder or commuter carriers who usually provide the service in non jet aircraft. In more recent years this trend has dominated, as these carriers are franchise or wholly owned subsidiary operators of the incumbent, who are now re-equipping with the latest generation of regional jets.

A study by Berry (1990) examines the importance of airport presence in determining the profit of operating in a given city pair. Ever since the formulation of the theory of contestable markets in a deregulated airline industry it has been suggested that entry or even the threat of it occurring will enforce competitive conditions. Some analysts have investigated potential barriers to market entry but only Borenstein (1989) and Levine (1987) have argued that airport presence at both ends of the city pair could provide significant advantages.

Prior literature could be classified in two groups: those emphasising the economies of hub-spoke networks, which make it easier for an airline to differentiate its product through schedule targeting, and FFPs. The other group argues that the incumbents' control of airports allows them to exercise a substantial strategic advantage in preventing entry. Although there are cost savings made by putting passengers with different ultimate destinations initially into the same plane the higher prices charged when travelling from such airports are the realisation of their dominating advantage. In the past models allowing for the higher prices and the lower costs involved in the hubs

have been developed. In this paper however an effort is made to quantify the profit advantage from such an airport presence. This could be useful to both airlines and policymakers. The former would try to alter market structure through mergers and the latter to achieve the same through subsidies or intervention for ease of entry.

Using a partial equilibrium approach, observations occur over one particular city pair at a given point in time. Given each firm's overall network structure it has to decide on the given city pair. Having considered all the relevant market-level variables i.e. its own airport presence and number of competitors in the city pair, it must calculate the likely post entry profits. If these are positive then market entry is made. The distinction is made of applying such a model to isolated markets rather than to oligopolistic ones. The discreet method approach of using observed entry decisions as an indicator of underlying profitability uses inferences about the firms' specific sources of profit in the presence of a large number of potential entrants. The periods examined were first and third quarter of 1980 which is long enough for the airline to plan and execute an entry decision but not long enough for cost and demand to change significantly. The period chosen is very close after the effective deregulation of the market and perhaps most airlines remained cautious as to how best to proceed.

A definite link between airport presence and airline profitability is shown although the benefits of this decline rapidly with increasing entries. Finally, the models used in this paper fail to fully describe the post entry competition or the full dynamics of entry. Further investigations are required.

2.3 STRUCTURE

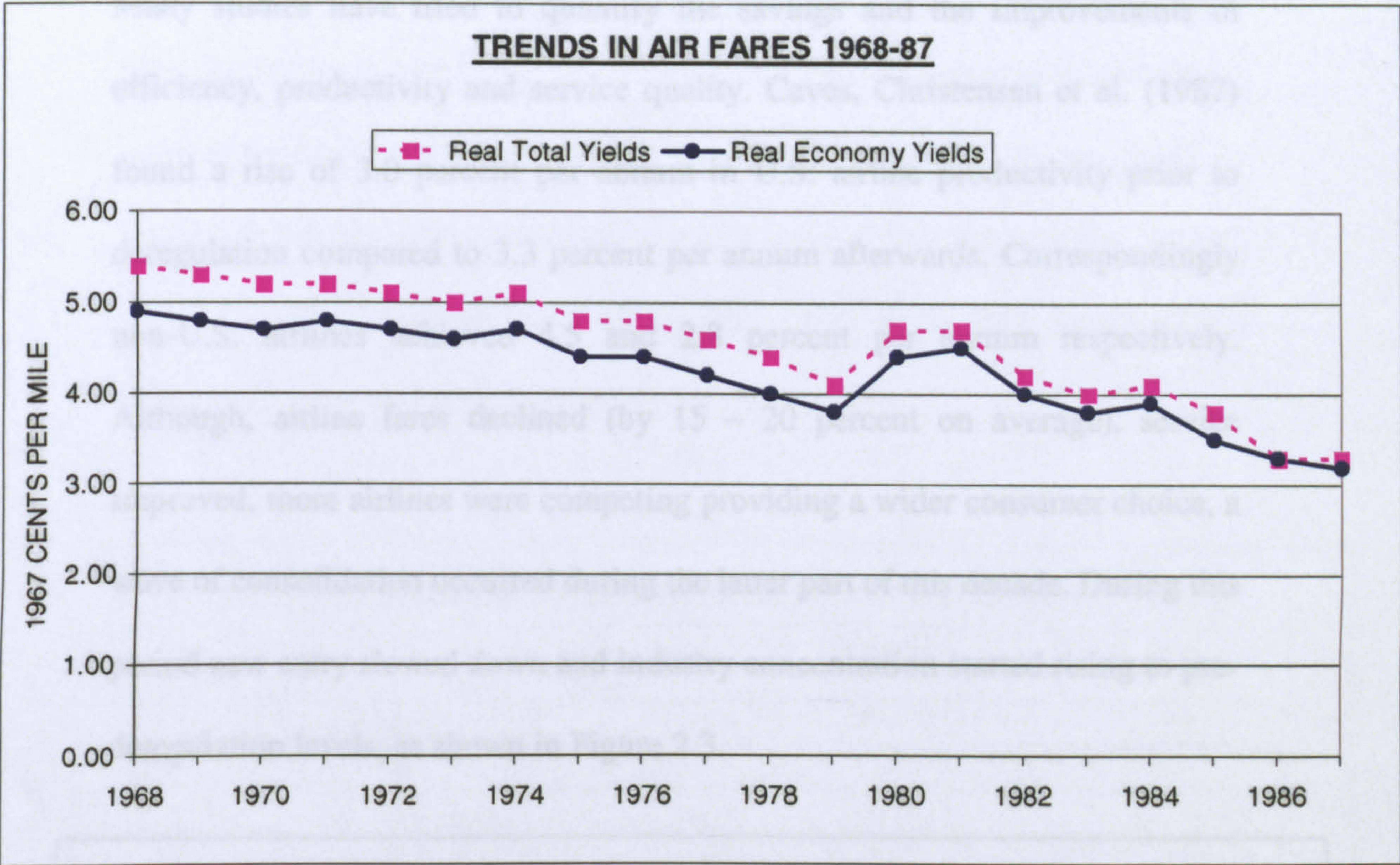
The early period considered to be the first 10 years from ADA passing was characterised by considerable turbulence, coinciding with two economic recessions, sharp increases and drops in the jet fuel prices and the mass dismissal of the air traffic controllers by President Reagan.

All of the new entrants had a variety of cost advantages over the incumbents by using non unionised labour, flexible working practices, cheap second-hand leased aircraft and lower wage rates. Using their lower costs they attacked the incumbents on trunk routes thereby diluting the incumbents' market shares across the country. The incumbents followed suit in trying to replicate the lower costs in equipment and labour of the new entrants, in the process creating considerable industrial unrest by upsetting entrenched labour positions.

The turbulence peaked in 1985-86 when competition had pushed a number of airlines into bankruptcy or merger. Those incumbents that survived had now relatively reduced their costs and had discovered that with a combination of aggressive pricing tactics and marketing tools they could knock out any new entrant infringing their network. All except one: Southwest Airlines.

Forsyth et al. (1986) not only found steady efficiency improvements in the U.S. carriers between 1979 and 1984 but also that overall efficiency is higher in the U.S. carriers than anywhere else in the world. This latter point could not necessarily be attributable to deregulation but to the overall structure of the U.S. airline industry, which had privately owned airlines, without state intervention enjoying a more liberal domestic environment when compared to the restrictive European international bilateral system.

Fares overall fell by 30-35 percent but only due to the wide variety of discount fares (see also fig. 2.5) that appeared as a way to stimulate traffic.



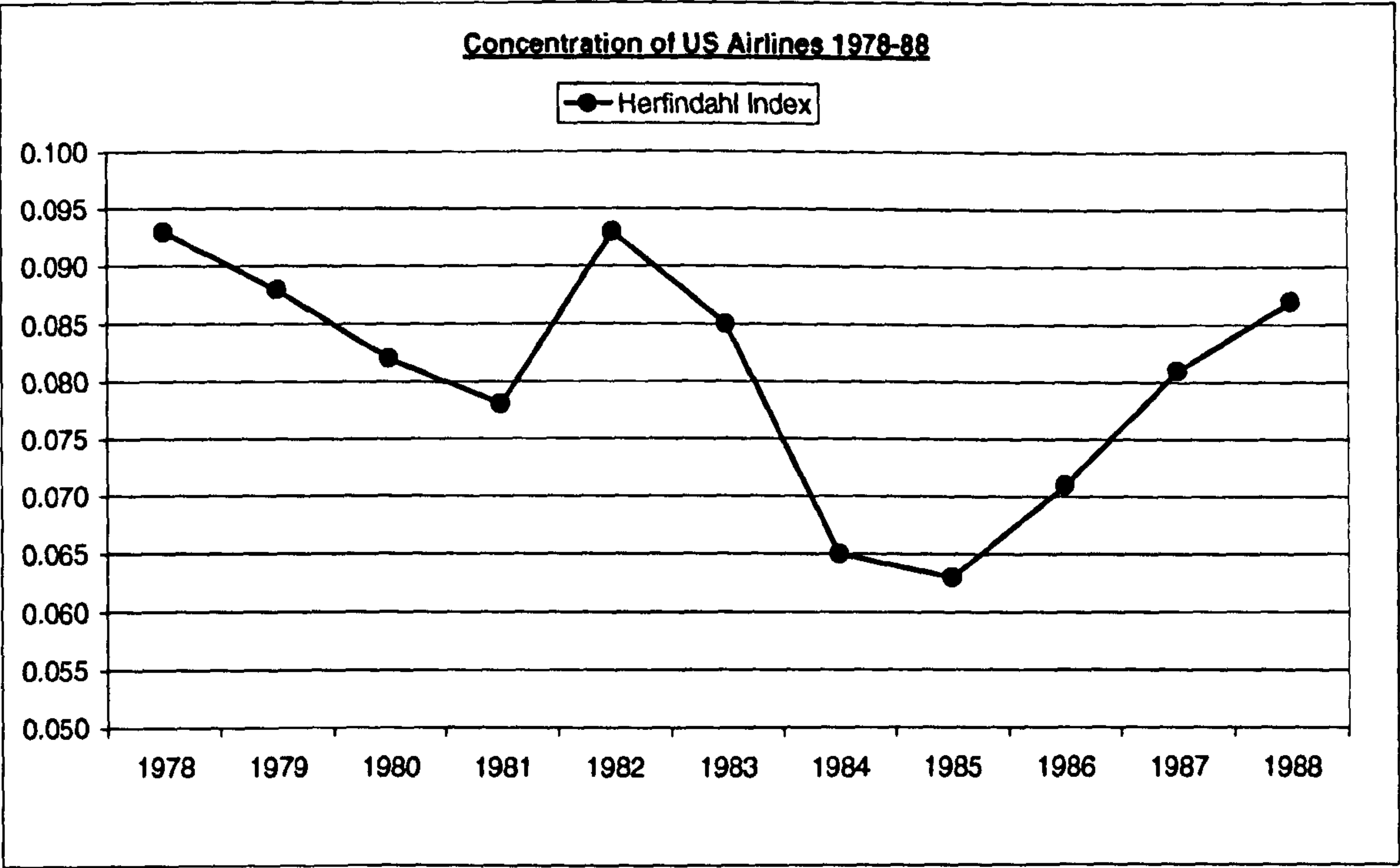
Source: ATA (2001)

Fig. 2.2: Trends in Air Fares 1968-87

McGowan and Trengrove, (1986) state that over 80 percent of passengers travelled on discount fares in 1984, compared to around 45 percent in 1978. Although the average fare has fallen the price reduction has occurred on the long-haul routes and the large city markets. On the other end of the spectrum, fares have increased on small distance and small city markets. This could be a logical correction as there is now a better resource allocation by airlines on these long distance markets which are more important to passengers because, in the U.S., the railway system does not provide an adequate alternative over

these very long distances. Traffic was therefore stimulated, particularly after a period of stagnation in the recession years.

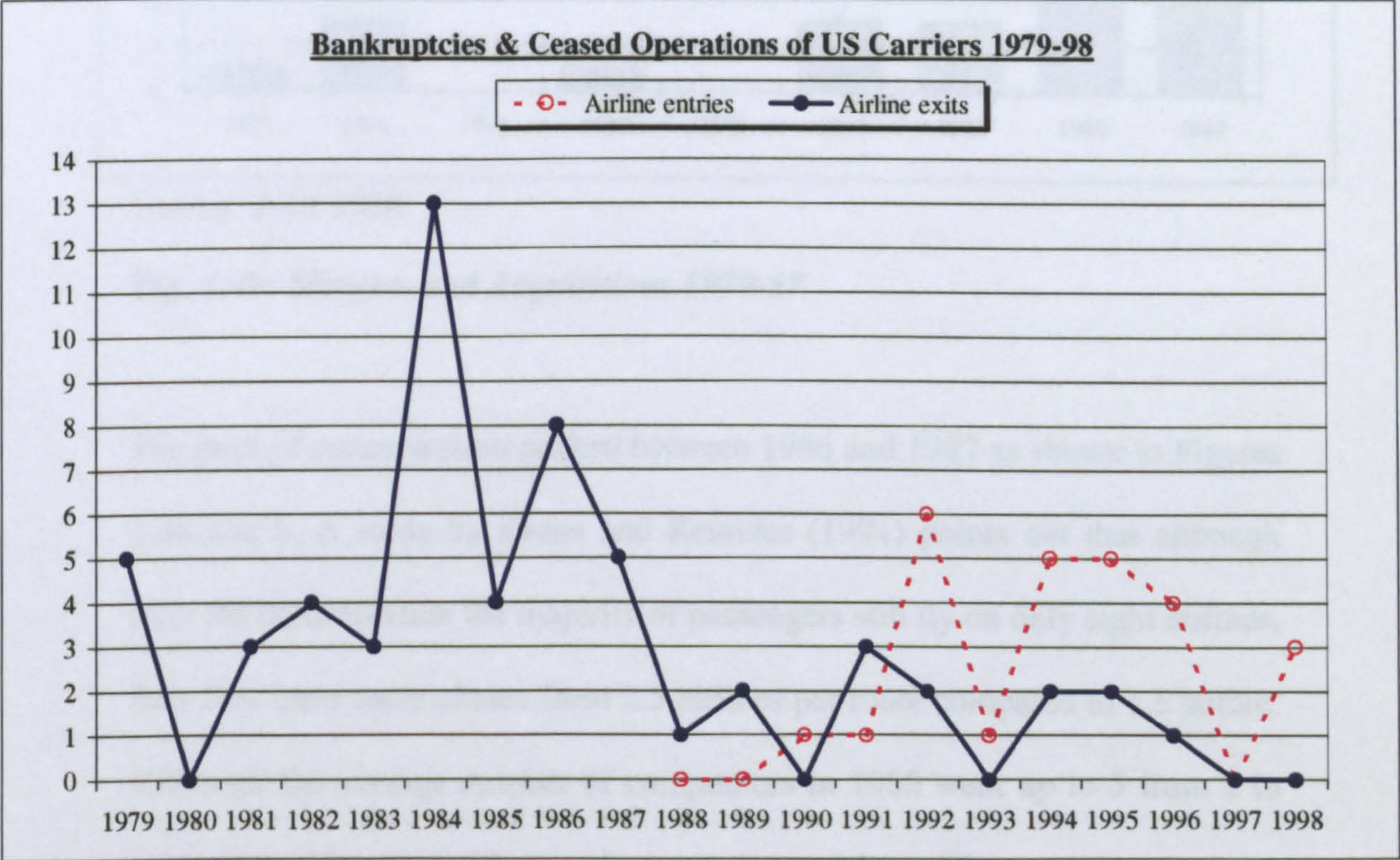
Many studies have tried to quantify the savings and the improvements in efficiency, productivity and service quality. Caves, Christensen et al. (1987) found a rise of 3.0 percent per annum in U.S. airline productivity prior to deregulation compared to 3.3 percent per annum afterwards. Correspondingly non-U.S. airlines achieved 4.5 and 2.8 percent per annum respectively. Although, airline fares declined (by 15 – 20 percent on average), service improved, more airlines were competing providing a wider consumer choice, a wave of consolidation occurred during the latter part of this decade. During this period new entry slowed down and industry concentration started rising to pre-deregulation levels, as shown in Figure 2.3.



Source: GAO/RCED-97-4 Barriers to Entry in the Airline Industry 1996

Fig. 2.3: Concentration of U.S. Airlines 1978-88

The last 2 years of the 1980s produced record traffic and profits for the reformed incumbents amid the general economic euphoria. However the early 1990s quickly undid all the progress, due to the 1990-91 recession and the Gulf War. Nevertheless, the booming economy that followed ensured record profits once again in the mid-90s. Average fares continued to fall in real terms by around 20 percent, partly attributed to a new wave of new entrants like ValuJet, Reno Air, who replaced those of the 80s. From them only AmericaWest, Midway Express and American Trans Air had survived.

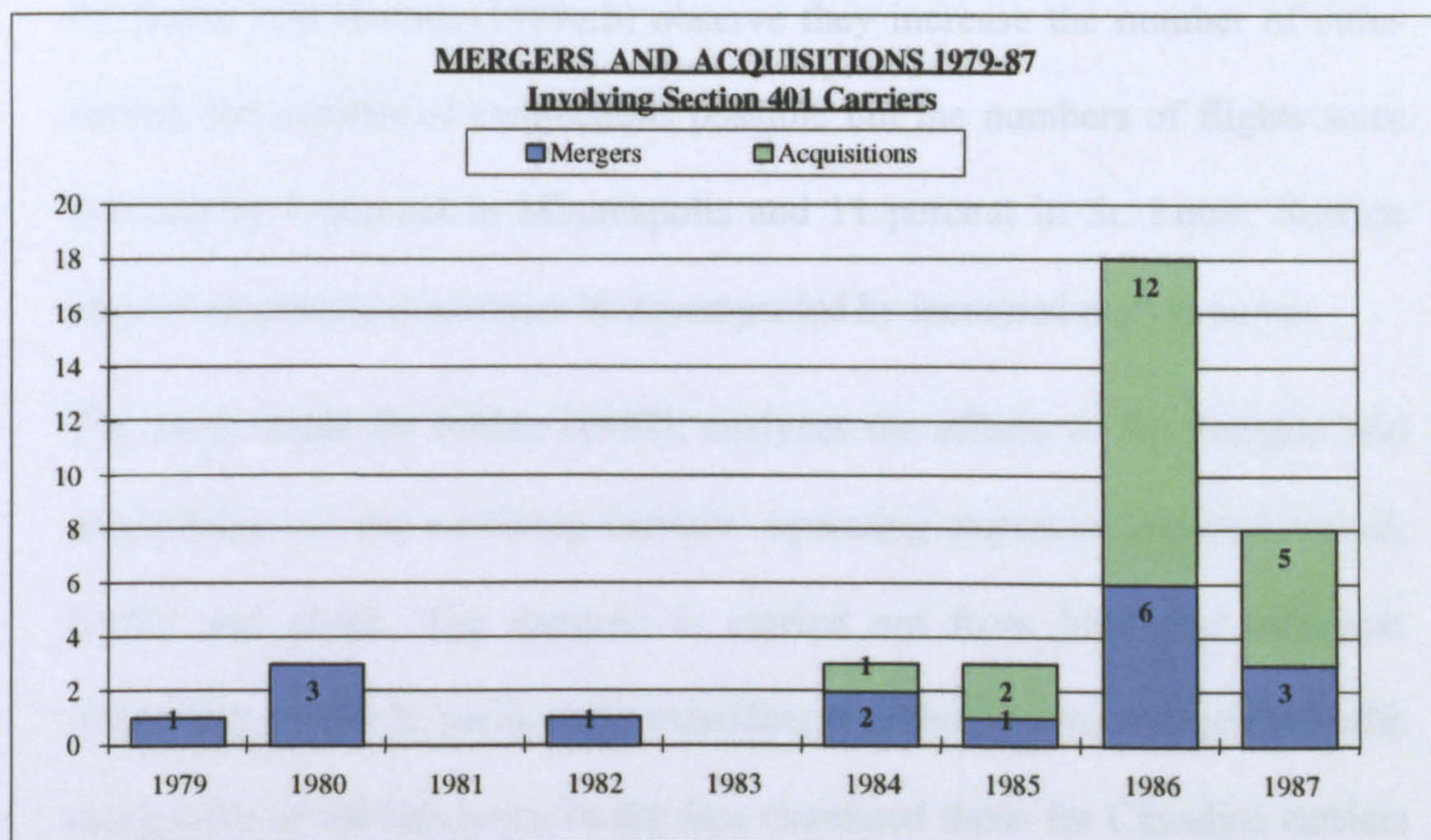


Source: Dresner and Windle 1999

Fig. 2.4a: U.S. Airline Industry Activity 1988-98

After 1985 a wave of mergers gripped the industry. The more notable ones are: Pan Am’s Pacific Division to United, Northwest - Republic, TWA – Ozark, Texas Air-Eastern, Texas Air-People Express and USAir-Piedmont. The U.S.

Department of Justice (DoJ) has resisted mergers of airlines sharing the same hub but the Department of Transport (DoT) allowed them.



Source: FAA 1988

Fig. 2.4b: Mergers and Acquisitions 1979-87

The pace of concentration peaked between 1986 and 1987 as shown in Figures 2.4a and b. A study by Evans and Kessides (1991) points out that although after the consolidation the majority of passengers still fly on only eight airlines, they now have more choice from 2.5 airlines per route compared to 1.5 before. Although the average number of competitors in 1988 went up to 5 from 2 in 1978, they only account for a very small share of the traffic.

Regarding the wave of mergers they state that most mergers and acquisitions occurred between carriers with complementary route networks. The exceptions to this observation were Northwest - Republic and TWA - Ozark who shared the same hub. It could be said that these horizontal mergers were actually rationalising the market as they were eliminating 'redundant' capacity.

Purposefully reducing competition is another valid argument, as the two are not mutually exclusive.

As Butler and Huston (1989a,b) observe they increase the number of cities served, the number of connections possible but the numbers of flights were reduced by 7 percent in Minneapolis and 11 percent in St. Louis. Service improvements can sometimes be accompanied by increased market power.

The study made by Jordan (1988), analyses the effects of the mergers and acquisitions on the surviving carriers' operating expenses, airports served, traffic and profit. The analysis is carried out from historical and post deregulation periods, particularly extending it to the relative changes in traffic and profits of the survivors. In the data examined those for Canadian carriers are also included. For the mergers occurring during the period of regulation i.e. up to October 1978, suggest that, although other related factors are at work, somehow a number of points in the carriers system that could be served efficiently in a smaller network could not be served as efficiently in a larger one. For the group of early mergers (1979-1982) occurring after deregulation, including Continental - Texas Air Corp., Pan Am - National, Republic - Hughes Airwest, and North Central - Southern a consistent pattern emerged whereby every survivor does terminate service to a large number of points and until they have done so their operating expenses per RTM increase relative to comparable carriers. Showing that with one exception the norm for the carriers was to increase their points served right up to 1984 disproves the argument that under deregulation all trunk carriers of the time were terminating services to various points. Hence the termination of points served is identified as a characteristic of the merged airlines only. The deletion of services naturally,

has a negative impact on the traffic of the surviving carrier as not only does it make the carrier's network more homogenous but also reduces the total market served. In fact, decreases in relative traffic were in evidence in a variety of degrees, in all four mergers analysed.

Studies published by Keeler (1981) have tried to prove a correlation between concentration (measured by the Herfindahl Index) and fares, indicating that entry of a new firm even by an established 'high cost' carrier does have a downward effect on fares. Kanafani and Hansen (1989) agree that the Herfindahl Index¹⁰ can and should be used to measure industry concentration. In the case of deregulation it is specifically applied to concentration of network hubs. Reynolds-Feighan (1992) however suggests that the main problem with the Herfindahl Index is that it can be a poor measure as it is size dependent and relatively insensitive to changes in the number of airports served and to the redistribution of traffic among these airports over different time periods. Alternatively the Gini Index¹¹ is presented as more suitable because it measures the difference between actual traffic distribution and a traffic distribution where all the carriers carried the same proportion of traffic. Furthermore it takes account of more intuitive properties which good measures of concentration should have.¹² Using this index it was shown clearly that airport

¹⁰ The Herfindahl Index is defined as $H = \sum_i \left(\frac{x_i}{\sum_i x_i} \right)^2$ where x_i is the traffic or its distribution in airport i as handled by carrier i

¹¹ The Gini Index of concentration is defined as $G = \frac{1}{2n^2} \bar{y} \sum_i \sum_j |y_i - y_j|$ where the y 's are air traffic at i and j , are ranked in increasing order and \bar{y} is the mean.

¹² Sen (1976) established 4 axioms that define these more intuitive properties of a good concentration / inequality measurement index

and airline concentration were very high prior to deregulation, so that the hubbing phenomenon, supposed to be a deregulation development, had been in place for a long period before passage of the ADA. During deregulation it simply became more prominent.

One other aspect of the mergers has been whether a wave of mergers will result in the concentration of traffic in the hands of the few. Jordan (1988) proposes to examine firstly if the size has been associated with increasing traffic shares and whether the traffic shares of the surviving carrier will be so much larger than previously, thus increasing disproportionately their future market power. The data from this show that all but Northwest of the seven largest carriers lost traffic share during the initial years of deregulation. Even Northwest's results are attributed entirely to its international services where deregulation did not apply. After its merger with Republic in 1985 it too lost traffic share. In the 1985-86 period only American had a larger traffic share than 1979, which it did not surpass until 1985, six years after deregulation. Hence taking all seven largest carriers' experience together between 1979 and 1986, does not support the argument that size alone bestows significant market power.

The next factor examined were the profits following the mergers. As examined above, increases in average operating expenses and the decrease in traffic imply decline in profits following a merger. Other expenses directly related with mergers are increased debt and increased interest expenses, fleet rationalisation and re organisation of staff expenses will ensure the merger will be felt in the finances of the airline for a long time after it occurs.

In the comparison made of the profits before tax and profits as percentage of total expenses for merging and non merging carriers, it is discovered that the

merging carriers suffered on both counts. Generally, the performance above indicated that mergers have an overall adverse effect on the profitability of the merging airline and under the initial period of deregulation yielded lower profits among merging carriers as compared to comparable ones. One note of caution which needs to be made here is that the period during which these results were collected was during a recessionary economic cycle which would tend to apply downwards pressures on the economic parameters of any carrier world-wide. Hence, the effects of the recession could be diluting the real picture.

A parallel analysis of the behaviour of the Canadian carriers that merged following the deregulation of the market was undertaken in this paper. The results relevant to the evidence on average operating expenses per RTM obtained from U.S. carriers compare favourably with the Canadian ones and follow exactly the same pattern with discontinuing service to several points after the merger. There were also declines in the traffic shares of the merging carriers as well as adversely affected profits. The consistency of the pattern regardless of the regulatory environment in operation provides ample evidence that mergers in the industry provide fundamental effects on their performance, which are usually adverse.

Merging airlines tend to have a slower post-merger growth of traffic. The points they will drop could foster further competition perhaps amongst a smaller scale carrier. This is currently applied by the use of smaller associated or partly owned commuter carriers which code share and co-ordinate their schedules with the majors, effectively allowing their parent airline to reduce their average costs by dropping points to its smaller associate. Also, unless the

merged majors are able to reduce their operating expenses down to those of unmerged airlines they will lose even more traffic to the unmerged lower cost carriers. A typical example of this are carriers which have not merged often which now enjoy cost advantages but have less market power like Southwest.

2.4 COMPETITION

Studies by Bailey, Graham and Kaplan (1985), Morrison and Winston (1987), Borenstein (1989), Butler and Houston (1989b) have found flaws in the original hypothesis and have also discovered that a relationship does exist between concentration and fares. Both Morrison and Winston (1987) and Keeler (1978) proved and predicted that potential entry does not play an important role in determining fares.

As the forces of deregulation proceeded, academic consensus has moved away from the belief of the early 80s that markets are fully contestable and due to a more recent study by Reiss and Spiller (1989) a new model has been developed. This finds that oligopoly behaviour with regard to airline entry and price competition is applicable in low density markets where the fixed costs are very small.

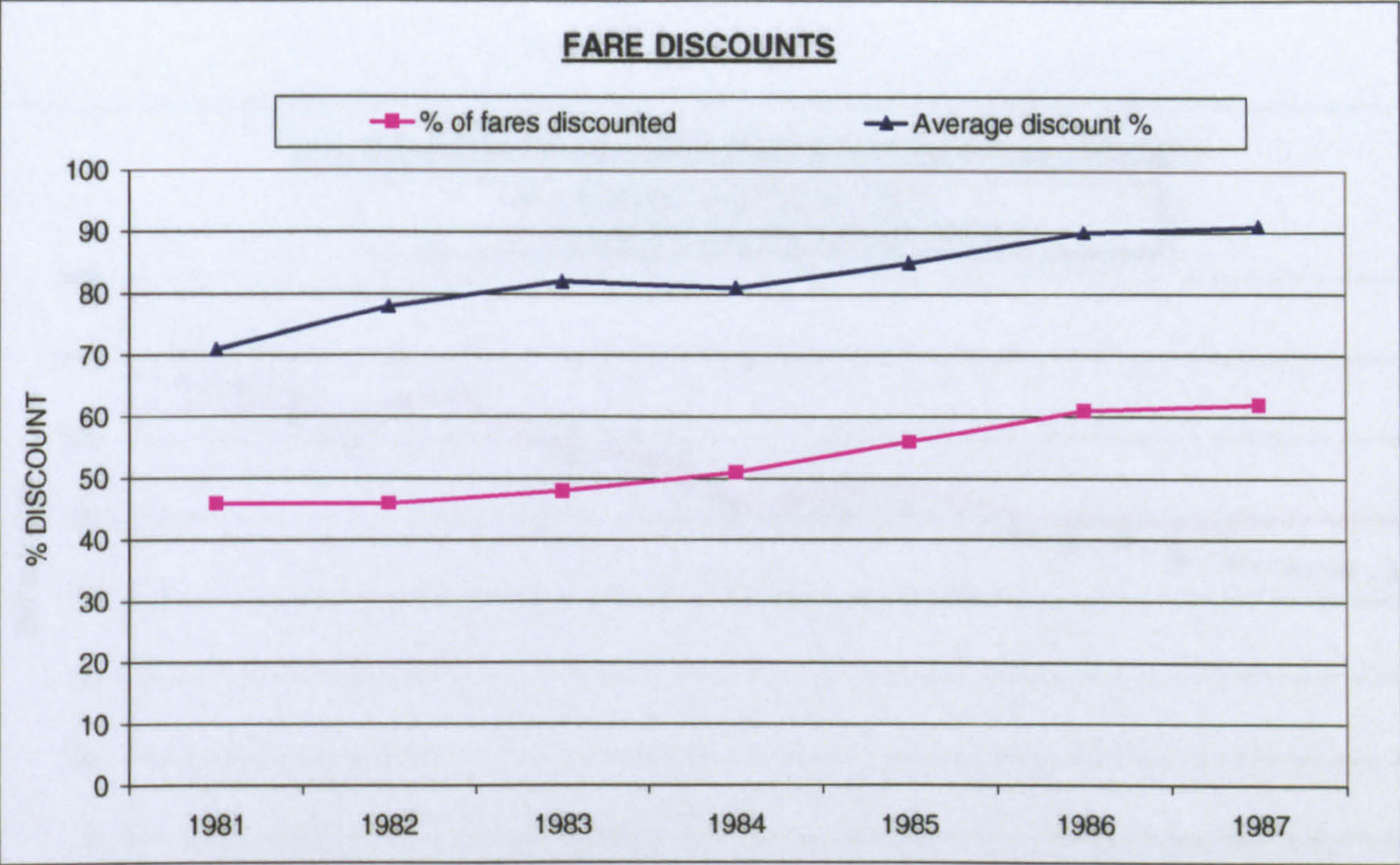
Other studies made by Call and Keeler (1986); Hurdle, Johnson et al. (1989) have tried to establish if the contestability theory holds then the number of airlines actually competing on a route should have no effect on prices. Unfortunately they have all found that: in 1990 prices, two active competitors reduced prices by 8 percent than monopoly, and a third competitor produced a

further 8 percent reduction, all other things being equal. Hence, potential competition is not sufficient substitute for actual.

Morrison and Winston stipulate that the total benefits to the public have been in the order of \$5.7bn in 1977 values and the industry profits were \$2.5bn higher than they would have been without deregulation. Additionally, they state that stock market valuations when analysed confirmed the pattern of profitability. Between 1976 and 1983 there has been almost no change in the total value of stock for the big national carriers, while regionals increased theirs six-fold in the same period.

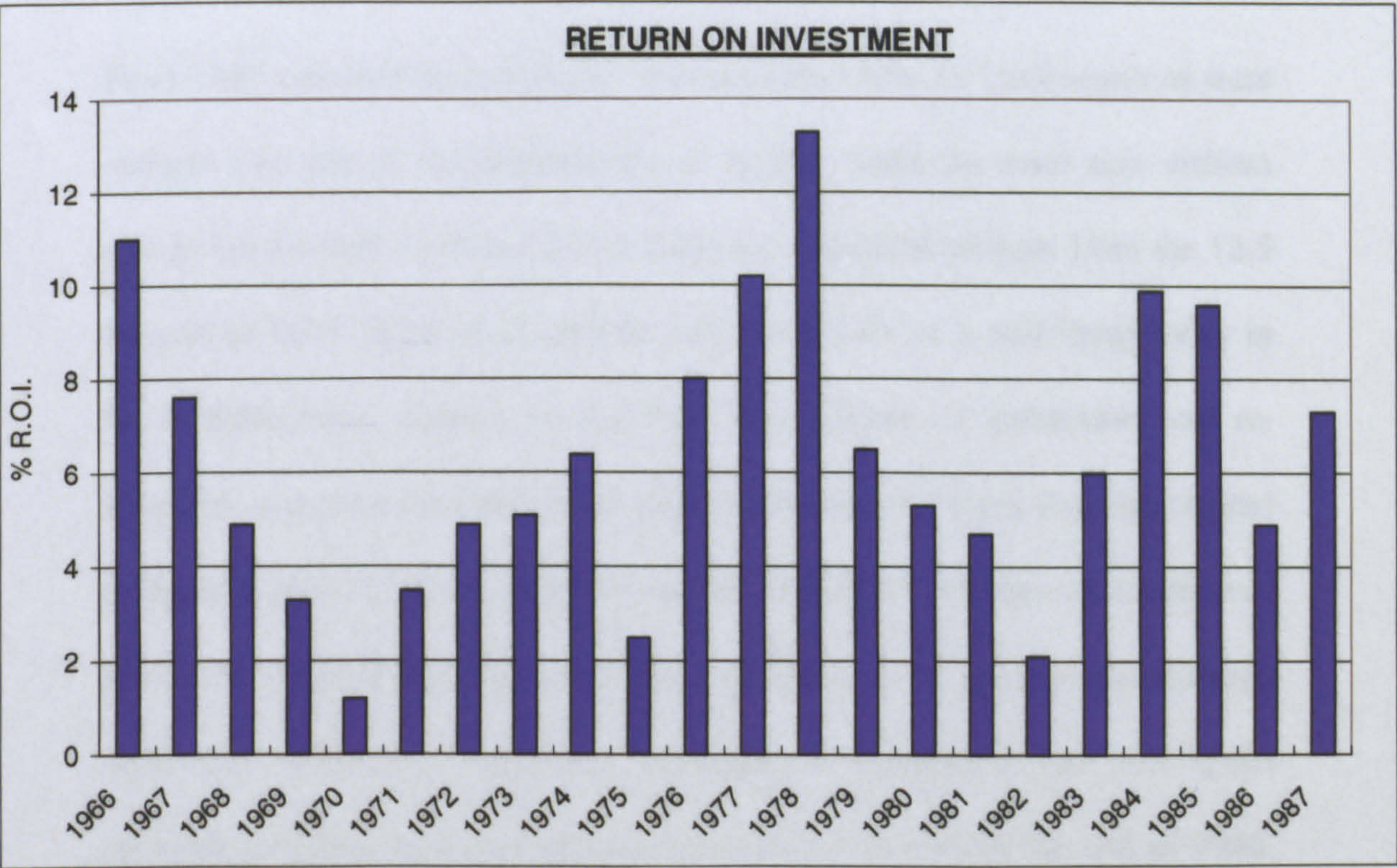
Accordingly, profitability declined sharply, and return on investment plummeted by 11.2 points from 1978 to 1982. (Figs. 2.5, 2.6 and 2.7) What is difficult to estimate is how much is attributable to the recession and how much directly to deregulation.

It is interesting to note however, that the decline in R.O.I. started just ahead of the ADA passing, which tends to suggest that airlines were already preparing themselves ahead of the actual legislation. By the end of this initial period and during the latter part of the 1980s the industry entered a wave of consolidation.



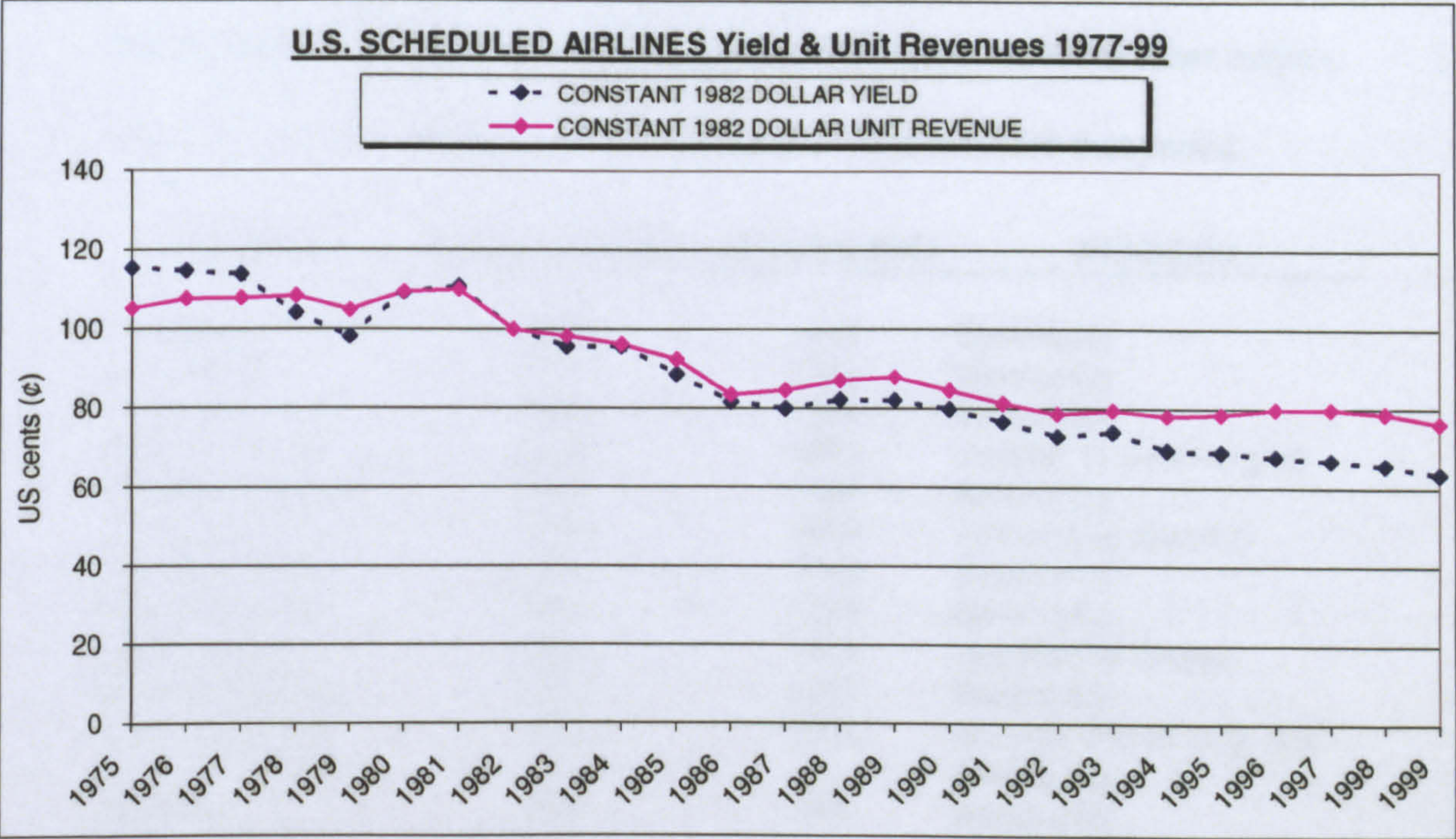
Source: US ATA (various years)

Fig.2.5: U.S. fare discounts 1981-87



Source: US ATA (various years)

Fig.2.6: U.S. Carriers R.O.I. 1981-87



Source: US ATA (various years)

Fig.2.7: U.S. Carriers Earnings 1977-99

From 1985 onwards the initial new entrants either filed for bankruptcy or were merged into one of the incumbents, so that by 1988 the main new airlines accounted for only 7 percent of the domestic scheduled mileage from the 12.5 percent of 1985. Of all those airlines only AmericaWest is still flying today in its original form, despite having filed for Chapter 11 protection and re-emerged. A typical example of this phase is the rise of People Express, created by Donald Burr in 1981 initially flying just 3 Boeing 727s. The combination of ultra low, no-frills fares (in some cases as low as \$19), a loose management style and stockholder-employees, managed to establish a hub and spoke network radiating from Newark and grew to 80 aircraft by the end of 1986. Trying to compete with the majors, People Express became involved in price

cutting competition that reduced their yields, profitability and ultimately led to failure. Texas Air, the parent of Continental Airlines took over People Express and continued to use its low costs against the competition from other majors. Table 2.1 shows a summary of the start-up's development for that period.

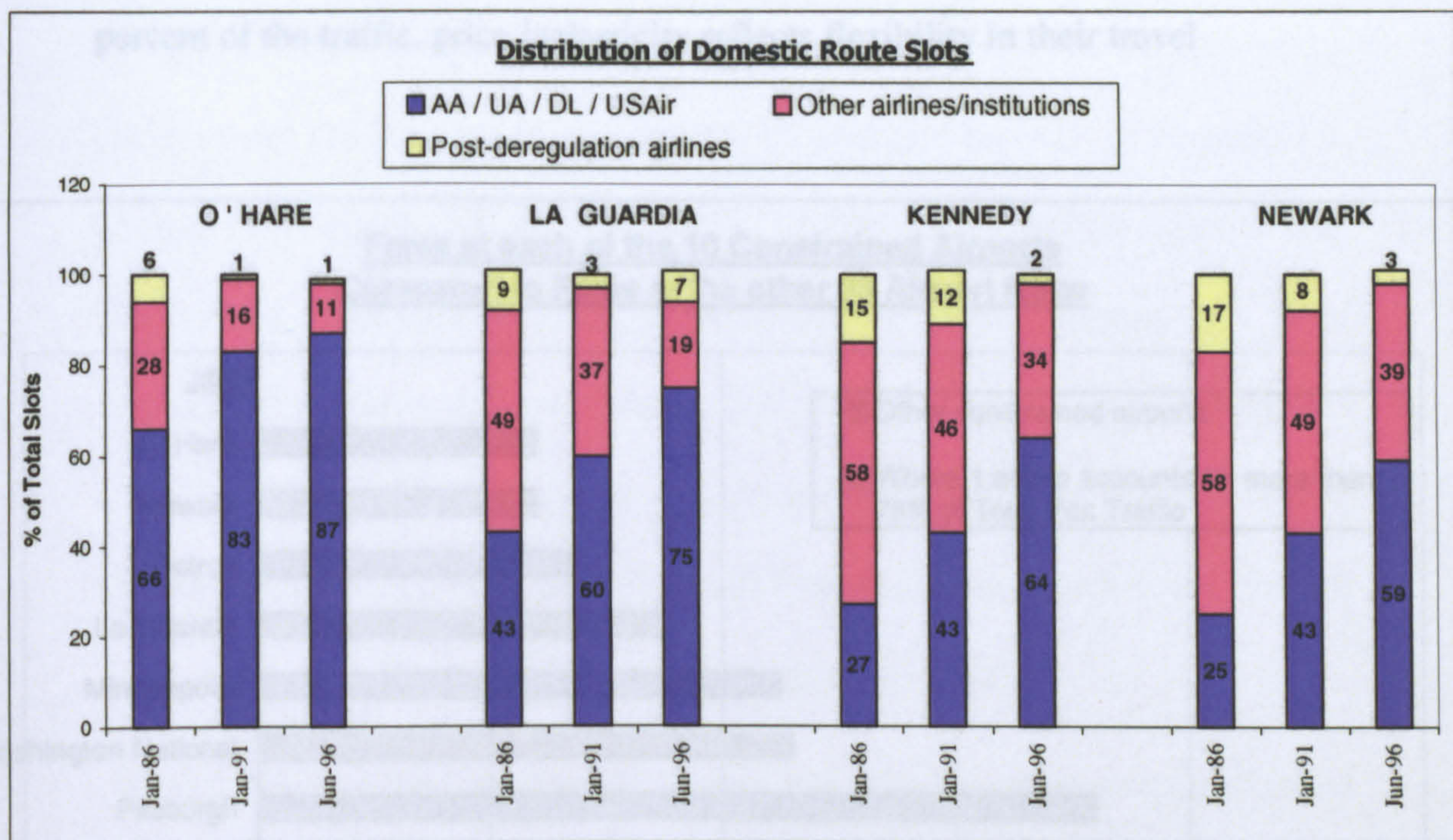
CARRIER	SERVICE ENTRY	SERVICE END	REASONS
Air Atlanta	1984	1986	Bankruptcy
Air Chicago	1980	1982	Bankruptcy
Air One	1983	1984	Bankruptcy
America West	1983	1994	Chapter 11 (re-emerged)
American Internat.	1982	1984	Bankruptcy
Florida Express	1984	1988	Acquired by Braniff II
Frontier Horizon	1984	1985	Bankruptcy
Hawaii Express	1982	1983	Bankruptcy
Jet America	1982	1986	Acquired by Alaska
McClain Airlines	1986	1987	Bankruptcy
MGM Grand Air	1987	1993	Became charter only, then Bankruptcy
Midway	1979	1991	Bankruptcy
Midwest Express	1984		Still Operating
Muse (TranStar)	1981	1985	Acquired by Southwest Airlines
New York Air	1980	1985	Acquired by Continental
Northeastern	1982	1984	Bankruptcy
Pacific East	1982	1984	Bankruptcy
Pacific Express	1982	1984	Bankruptcy
People Express	1981	1986	Acquired by Continental
Presidential	1985	1989	Bankruptcy
Sun World	1983	1988	Bankruptcy
MGM Grand Air	1987	1993	Became charter only, then Bankruptcy
Air Winsconsin ^a	1982	1992	Acquired by United
Empire ^a	1980	1986	Acquired by Piedmont
Horizon ^a	1981	1986	Acquired by Alaska
American Trans Air ^l	1992		Still operating
Capitol ^b	1979	1984	Bankruptcy
Carnival ^b	1988	1997	Acquired by Pan Am II
Morris Air ^b	1992	1994	Acquired by Southwest A/I
Tower ^b	1983		Still operating
World ^b	1979	1985	Bankruptcy

Source: Gudmundsson (1998)

Table 2.1: Start-up jet operating new-entrants 1979-1986

As discussed previously airline networks have become more efficiently organised as the industry structure has become more competitive. Kanafani and Hansen (1989) claim that hubbing can increase productivity by allowing the use of larger economical aircraft, maintain high frequencies and high load factors. McShan and Windle (1989) examined the economic effects of hubs on a network level and state that although individual city pair markets may be regarded as contestable economic rent can be gained by incumbents due to superior access at the airports more suitable for hubbing which they already hold. As a result airport access constraints not only prevent new entrance or existing airlines from constructing a competing hub and spoke network at pre-existing airports, but also reduces the ability of others to achieve similar traffic densities and therefore their unit costs become disproportionately higher. Raising competitors' costs is an established anti-competitive tactic. As non incumbents are not able to obtain the slots to either enter the market in sufficient scale to obtain market share, or even existing carriers with established hubs elsewhere are also blocked, then the entrenched position is safeguarded and in due course it is possible for the newer carrier to be gradually squeezed out altogether. A comparative study is shown graphically in Fig. 2.8.

The recommended solution is to increase capacity at targeted airports and to use efficient pricing of the existing facilities. However the relationship between airports and their best clients with their long lease agreements severely restrict this possibility.



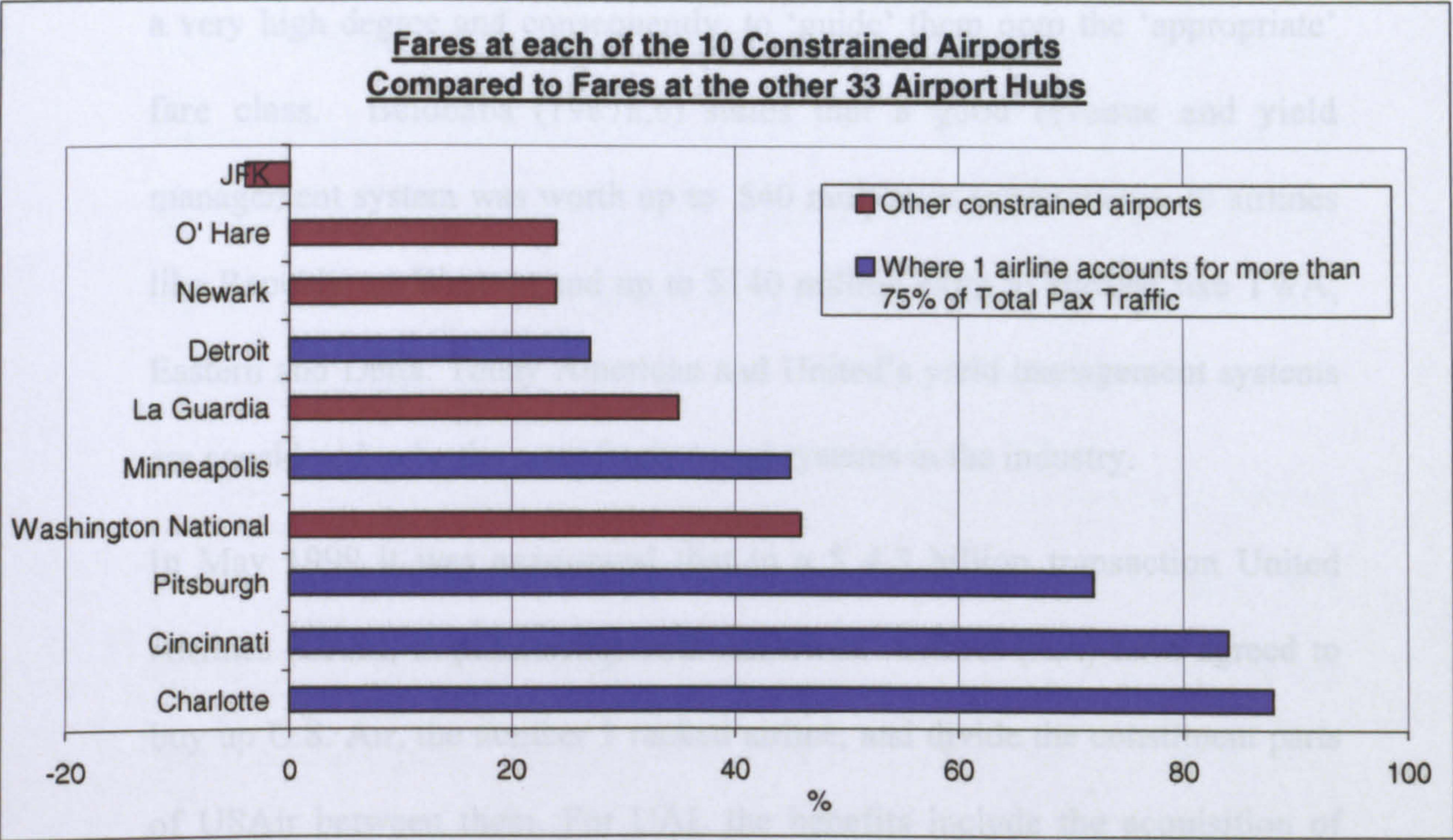
Source: TRB-NRC Special report 255 (1999)

Fig.2.8: Domestic Slots Distribution

The second effect caused by the constrained hubs is that because a carrier is dominant on the spoke routes, new entry is mostly impossible and the incumbent it has the market power to apply premium fares on routes radiating from the hub. This is demonstrated in Fig. 2.9 overleaf.

During deregulation's second decade average fares have continued to decline more than 20 percent in real terms [Meyer and Menzies (2000)]. In the TRB - NRC Report (US NRC 1999) evidence was found that increasingly average fare prices mask wider dispersion of fares. This tends to suggest that a few travellers are increasingly restricted to paying higher fares and at the same time passengers on short haul routes are finding fewer of the cheapest fares

available. For the former group which today account for between 40 – 60 percent of the traffic, price inelasticity reflects flexibility in their travel



Source: TRB-NRC Special report 255 (1999)

Fig.2.9: Effect of hubs on fares

planning (peak hour flights, changeable itinerary etc.) For the latter group it reflects the low and heavily restricted fares they enjoy priced on a marginal cost basis. However the overall picture that comes across from the report is that the airlines are trying to shift various groups of passengers onto higher fare classes. Between the years 1992 and 1998 the highest 5 percent of fare payers increased from 8 percent to 18 percent in short haul markets, and from 13 to 17 percent in the medium and long haul markets, respectively. Conversely, in the same period the lowest 5 percent of fare payers declined from 14 to 10 percent in short haul markets, and remained almost constant in the others. The passengers most likely to be suffering high fares are business passengers

travelling from a major airline's hub airport, for a trip of short to medium length. The optimisation of yield management systems has been instrumental in this area. Firstly, it helps the carrier to differentiate between its customers to a very high degree and consequently, to 'guide' them onto the 'appropriate' fare class. Belobaba (1987a,b) states that a good revenue and yield management system was worth up to \$40 million in extra revenue to airlines like Republic or Western and up to \$140 million extra to carriers like TWA, Eastern and Delta. Today American and United's yield management systems are considered to be the most finely tuned systems in the industry.

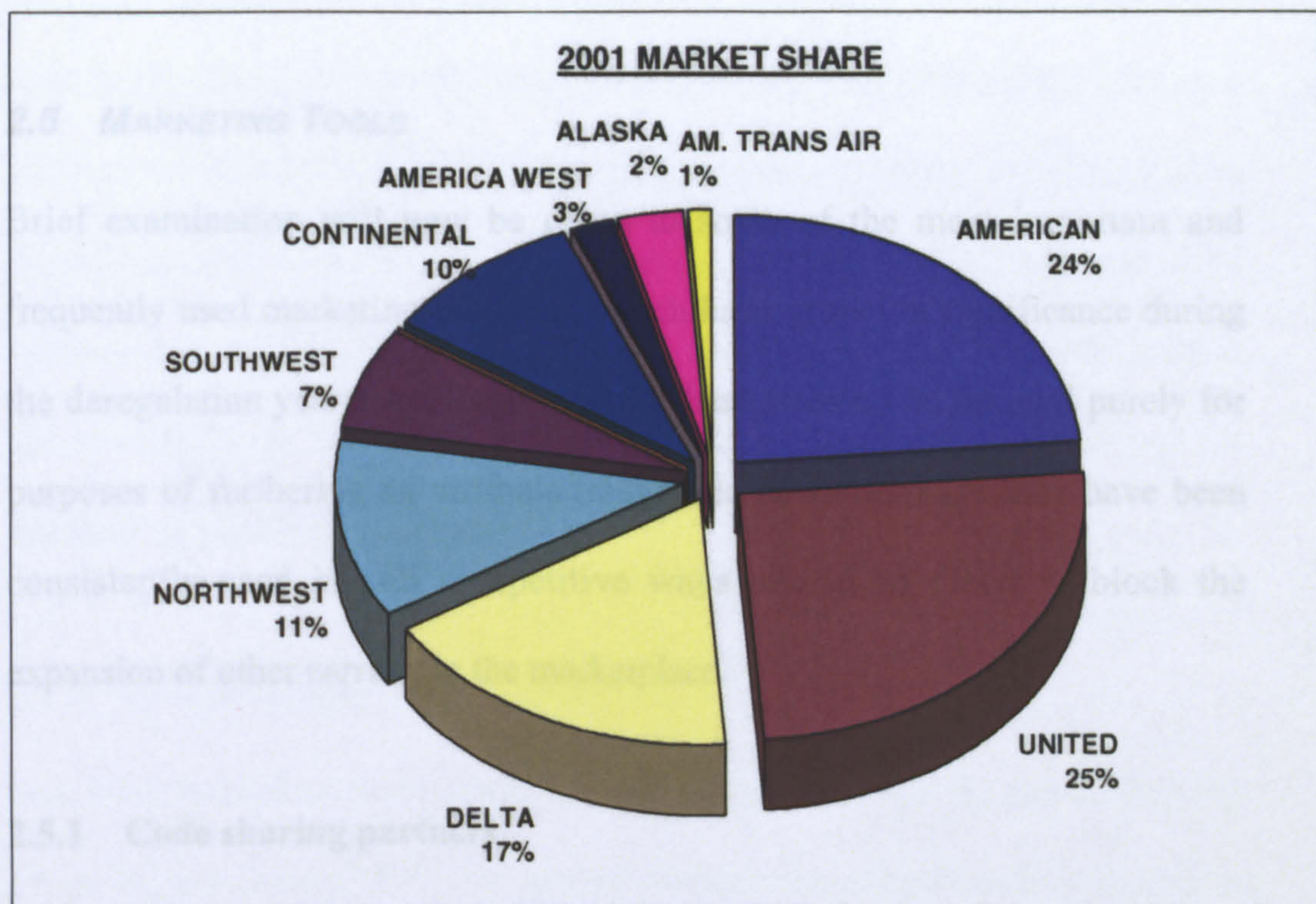
In May 1999 it was announced that in a \$ 4.3 billion transaction United Airlines (UAL), in partnership with American Airlines (AA) have agreed to buy up U.S. Air, the number 3 ranked airline, and divide the constituent parts of USAir between them. For UAL the benefits include the acquisition of USAir's hubs at Charlotte (90 percent seat dominance), Pittsburgh (89 percent), and Philadelphia (66 percent), the lucrative East Coast Shuttle and 80 percent of its USAir's total available capacity where AA will get the other 20 percent. According to Michael Levine, co-architect of the early deregulation at the CAB and Harvard law professor, the fact that UAL's arch rival AA was invited into this merger by UAL seems to show that the two giants are embarking on a 'share ubiquity' philosophy which means sharing the higher yield East Coast market, which is now impenetrable due to infrastructure constraints and from that derive monopolistic rents which can be used to fortify their positions in other markets. This way they will maintain '...a revenue premium over Delta, Continental and Northwest...generate network rents and

stave off the economic impact of Southwest which has recently entered the New York market area at a secondary airport (Islip)'.

In July 2001 however it was made clear that the DoJ would not provide antitrust clearance to the merger which was immediately abandoned by the two major airlines. In what has been described as a “..most surprising antitrust decision of the Bush administration ” it pointed to the fact that the DoJ under the new Republican President will be quite different to that under previous Republican Presidents.

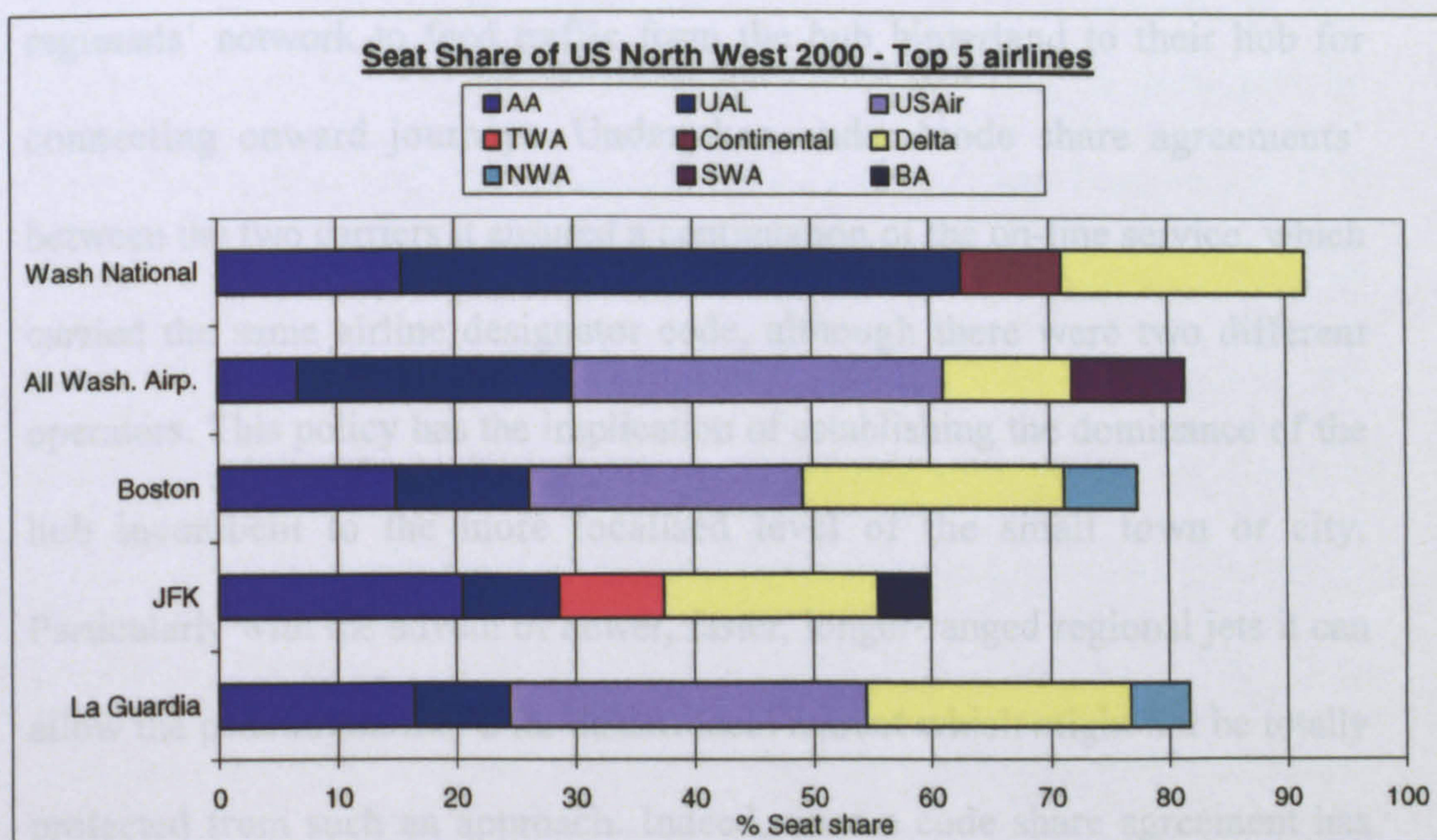
In parallel to that it was announced at the end of 2000 that American Airlines was buying the long-ailing TWA for \$500 million. In the last 10 years TWA has filed for bankruptcy protection twice, has very few real assets and has never been profitable. However, it was the dominant carrier in a central mid-continent hub of St Louis and employed 20,000 people. Both merged airlines seem to suggest that their revenues has been weakened long term by the presence of low cost competition, particularly by Southwest around St Louis and the East Coast region.

This new development had it gone ahead, certainly would have adverse implications for competition both on a national level as well in the North East regional level. A comparison is shown in figures 2.10, 2.11 below. It can be seen from these that the low cost carriers account for only 11 percent of Available Seat Miles of the total U.S. market.



Source: ATW and Airline report data at Jan 10, 2001

Fig.2.10: Recent U.S. consolidation



Source: ATW and Airline report data at Jan 10, 2001

Fig.2.11: Further U.S. consolidation

2.5 MARKETING TOOLS

Brief examination will now be given to some of the most important and frequently used marketing practices, which have grown in significance during the deregulation years. Although most of these tools could be used purely for purposes of furthering an airline's image and customer base they have been consistently used in anti competitive ways and in an effort to block the expansion of other carriers in the marketplace.

2.5.1 Code sharing partners

The transformation of the airline networks was accompanied by a simultaneous expansion in joint marketing agreements between the major airlines and a variety of commuter or regionals. The aim was for the majors to use the regionals' network to feed traffic from the hub hinterland to their hub for connecting onward journeys. Undertaken under 'code share agreements' between the two carriers it ensured a continuation of the on-line service, which carried the same airline designator code, although there were two different operators. This policy has the implication of establishing the dominance of the hub incumbent to the more localised level of the small town or city. Particularly with the advent of newer, faster, longer-ranged regional jets it can allow the penetration into a far distant local market which might not be totally protected from such an approach. Indeed, once a code share agreement has been established and fine tuned it makes entering the market a costlier affair for any potential competitor.

On the other hand any commuter airline that enters into such agreements is usually dependent on the major airline for marketing, ticketing, reservation and a variety of other functions. The majors have tended to expect exclusivity from the commuters as a way to protect their product, investment and their catchment areas. This trend has now meant that increasingly commuter airlines are now partly or wholly owned subsidiaries of the larger carriers and are operated under the same brand.

2.5.2 Frequent Flyer Programmes

One other method to place barriers to new entry is through the use of Frequent Flyer Programmes (FFP). By giving various benefits like free tickets to frequent flyers, brand loyalty is encouraged making this type of passenger reluctant to switch to another airline so as not to lose these benefits. Additionally, the greater route network that the large airlines have gives a distinct advantage over the smaller airlines. One solution proposed by Borenstein (1989) and Morrison and Winston (1987) has been to tax FFP benefits as income. Differentiation should be made however between benefits accumulated on leisure and personal travel, which should not be taxed, and those from business trips which should since they represent untaxed compensation from an employer. Separating the two kinds however could have practical difficulties. One of the characteristics of FFPs are their tendency to persuade passengers to travel on a higher class fare than they would otherwise travel only to obtain the extra benefits offered by the programme. The U.S. General Accounting Office is suspicious that FFPs like CRS are barriers to entry and could thus result to higher fares. Likewise the European Commission

acknowledged that they could be 'distortive of competition'. It is quite possible that without hub and spoke networks FFPs are not as valuable and that once all the competitors have their own programmes set up then any advantages will be equalised.

2.5.3 Computer Reservation Systems (C.R.S.)

The majority of the space reservation for U.S. airlines is held in just two computer systems: SABRE owned by American Airlines and APOLLO belonging to United Airlines. The majority of travel agents responsible for the bulk of ticket reservations belong to one of these two systems. Travel agents' contracts with either system are structured so that it makes switching from one system to another a very expensive, unprofitable and cumbersome process.

Various rival airlines from time to time have complained, usually justifiably, that the systems are biased towards the airline that owns the system, giving priority to the owner's flights regardless of whether these flights are the most convenient for the trip requested. Hence there is a barrier for any competitor of these airlines to break into a market. New guidelines were drawn by the FAA dictating the conditions of use of the CRSs.

Another aspect of their anti-competitive effects is the possibility they offer to airlines to signal threats to their competitors, either to deter entry or to discourage lowering fares. Usually the one carrier signals its intention to respond to any cut in fares of its competitor by pre announcing greater cuts in the markets the competitor is entering, but to also announce wide-ranging cuts in other markets of its competitor which are not under been entered. Therefore the new entrant unless it wants a price war will have to cancel its original cuts.

All this occurs in advance of any actual fare cuts and never reaches fruition. Ironically this is the principle of contestability in reverse. Carriers like America West and Midway airlines are said to have been victims of this tactic.

At this point research has not shown conclusively that society gains from the ownership of reservation systems by the largest airlines. In the future good reasons might appear to warrant divestiture and separate ownership of these reservation systems from their present owners. American Airlines has already divested itself from exclusive ownership of SABRE.

3 DEREGULATION OR LIBERALISATION?

3.1 *THE EU AIRLINE DEREGULATION*

3.1.1 The EU Market Before Liberalisation

The problems arising from the iniquitous resolution of the issues in the 1944 Chicago Convention can be said to be directly responsible for the historical weaknesses of the European carriers. Fear of a very powerful United States eager to compete anywhere, but particularly in a Europe slowly becoming prosperous, led to European governments seeking protection measures to shield their airlines and their ruined economies. This naturally led to restrictive bilaterals and for some countries it led, in turn, to chronically under-productive and state subsidised flag carriers. Over the last 20 years as some of the European flag carriers became more productive and efficient (either through privatisation or other measures) and gained competitive advantage, their outlook tended to favour a multilateral competitive regime. Correspondingly, others, (e.g. Air France, Iberia, Alitalia, Olympic, TAP) have resisted this trend and have sought continued protection from the regulators and their respective governments. The fact that from the late 70s to the mid 90s most of these countries were under the control of centre-left governments meant that the possibility of adopting free market principles and economics were rather remote.

While the European carriers were engaged in a moderate competition in trans-Atlantic travel, the domestic scheduled market remained heavily regulated

through bilateral agreements until the mid-eighties. The European airlines were mainly public airlines or majority state owned. They enjoyed the duopolistic situation created by the bilateral agreements, which prevented new entry in the intra-European market. Through these bilateral agreements, the airlines pooled their revenues and shared capacity, thus eliminating any competition between themselves on these routes.

3.1.2 The EU Cartel Histories

Cartels are secret horizontal agreements concluded by the main economic operators in a given market, in order to eliminate competition between them, artificially raise prices and restrict output. These attempts to replace a competitive environment – the driving-force of a market economy – with coordinated and centrally controlled regulation of the market are by far the most destructive infringements of competition law. In increasingly economic globalisation the possibility of cartel formation is more pronounced since there can be a greater number of players as well as greater rewards for the successful cartel. Accordingly, the potential damage caused by cartels is increasingly severe. The creation of the illusion of competition although there is no effective consumer choice, fix the costs in line with the least competitive producer they form a barrier to any efficiency gain measures. On an international scale these cartels are estimated to cost hundreds of million of Euro on the EU economy.

The larger European countries were very reluctant until the mid-eighties to abandon the protected status of their national carriers by advocating more

liberal competition policies. These governments directly or indirectly subsidised their carriers, the extent of which, varied from country to country.

Airline	Capital injection (US\$ million)
State Owned	
Commission-approved state aid	
Sabena (1991)	1,800
Iberia (1992)	830
Aer Lingus (1993)	240
TAP (1994)	1965
Air France (1994)	3300
Olympic (1994)	2245
Alitalia (1997)	1708
Sub total	12,088
Using 'Market economy investor principle'	
Air France (1991)	338
Sabena (1995)	267
AOM (1995)	49
Iberia (1995)	593
Sub total	1,247
GRAND TOTAL	17,405
Private airlines	
BA (1993) (rights issue & bonds)	1355
KLM (1994) (rights issue & bonds)	1100
Lufthansa (1994) (rights issue & bonds)	1440
Finnair(1992/4/5)	175
Total	4,070

Source: Doganis 2001

Fig.3.1: State Aid Capital Injections For EU Carriers 1991-97

Financial assistance was provided to:

- 1) compensate airlines for the imposition of a public service obligation
- 2) develop and operate domestic services
- 3) encourage the acquisition and operation of specific aircraft (national or European designs)
- 4) provide service to economically underdeveloped regions of the country

5) simply to cover the operating costs of the airline since it was been used as an instrument of employment policy.

Stringent laws were enforced to deny access of competitors into the market, directly protecting the national airlines. The operation resulted in a very inefficient allocation of resources and these airlines consistently suffered losses.

In similar circumstances, in 1986, British Airways after having suffered consistent bad years was sold to the private sector. In early 1987 and after having undergone radical workforce restructuring program, BA waged a highly 'nationalistic' campaign to 'rescue' the failing British Caledonian from the hands of the foreigners, namely SAS, and 'took over' its only serious domestic rival.

With declining profitability in its European operations BA signed a marketing agreement with United Airlines. This way United's schedules and networks in America were integrated into BA's transatlantic services to American cities. At the same time this agreement enabled BA to share passengers and to increase the quality of service offered particularly to business travellers since they were able to find more suitably timed departures and arrivals. As a result BA's load factor on the transatlantic routes increased by up to 40 percent. These innovative operations enabled British Airways to rebuild its equity in a very short space of time.

Any comparison of the benefits of deregulation between EC and U.S. should be treated with scepticism because of the European market characteristics, which are covered in more detail in Section 3.5.

First, competition from other modes of transport (high speed trains, cars) is much greater over short haul distances than in the U.S.

Second, average journey lengths are shorter causing take off and landing costs to represent a larger proportion of total costs.

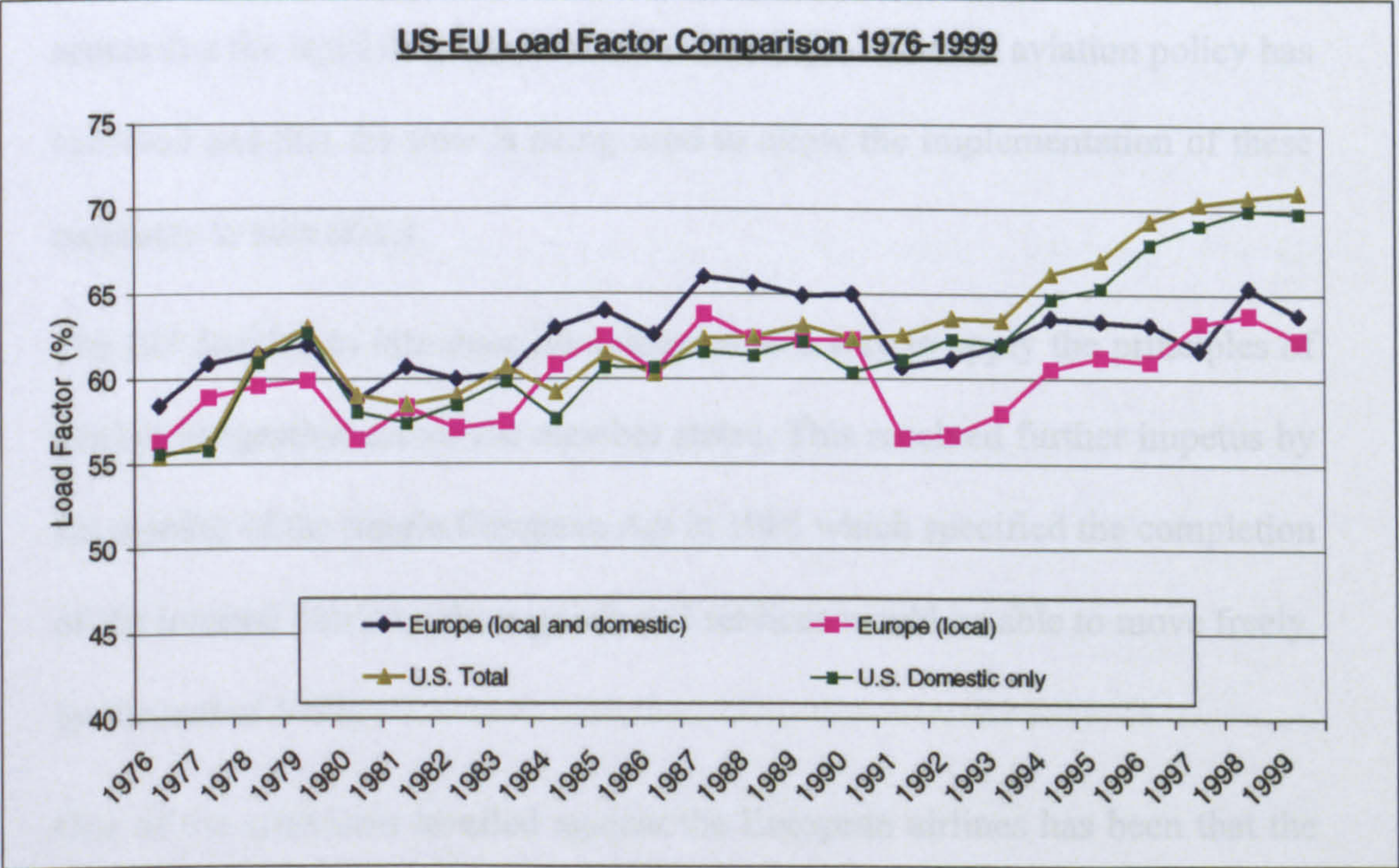
Third, Europe's domestic services account for a considerably smaller proportion than in the U.S.

Fourth, the U.S. never developed a significant charter market. This absence meant that while fares were regulated, carriers competed on service quality and thus operated very low load factors.

After deregulation carriers usually developed markets using low cost services for leisure travellers which raised load factors so as to reduce average costs. In the case of Europe, charter carriers have served leisure travellers satisfactorily within regulation. The effect of regulatory collusion has been to maintain higher than normal load factors. Furthermore, charter operations occur on distinct city pair routes, which sometimes don't even have scheduled service (Alpine and Mediterranean destinations) and usually are operated outside peak hours. Hence, given this situation in Europe it appears that there is scope for the development of discounted scheduled services for both leisure and business markets.

The likely gains from the anticipated increase in average load factors are more difficult to evaluate. The table below shows the general weakness in European load factors. During the 1990s they were indeed lower than the U.S. Following the recession of the early 1990s European load factors fell considerably more

than in the U.S., and needed a much longer time to recover. Additionally, it can be seen that higher load factors in domestic operations were, with the exception of 1997, generally higher than intra European ones. It is also shown that they have not been dramatically increasing since the advent of deregulation. Conversely, the U.S. data show a steady increase after the recovery from the early 1990s recession. The EU data can be compared with the expected figure of around 70 percent, indicating that the gains have not significantly affected average load factors.



Note: Local services refer to intra European services only
 Source: Compiled from AEA and ATA data

Fig. 3.2: Comparison of U.S. and European Average Load Factors 1976-99

The airline industry since the late 1980s has undergone an ambitious liberalisation process. For almost 30 years after the signing of the Treaty of Rome the air transport sector has been excluded from the jurisdiction of the European Commission. This changed in April 1986 when the European Court

of Justice ruled that the competition rules spelled out in the Treaty of Rome must also be applied to the transport industry. This historic decision opened the gates towards European airline liberalisation. In December 1987 the Council of Ministers adopted a first package¹³ of measures introducing new competition rules, relaxing price controls and opening market access. Over the time that followed pressure to further deregulate airlines mounted and by 1989 it resulted in a second phase of 'Euro-liberalisation' as it was later called. A third package¹⁴ of legislative measures leading towards an 'in-principle' open intra-European market was put into effect from 1st January of 1993. Since then it seems that the legislative momentum in creating a common aviation policy has subsided and that the time is being used to allow the implementation of these measures to take effect.

The EU decided to introduce liberalisation as a way to apply the principles of market integration across the member states. This received further impetus by the signing of the Single European Act in 1986 which specified the completion of the Internal Market, where goods and services would be able to move freely, by the end of 1992.

One of the criticisms levelled against the European airlines has been that the price on most routes has been consistently higher than prices charged for

¹³ *Council Regulation No 3975/87* laying down the procedure for the application for the rules on competition to undertakings in the Air transport sector. *Council Regulation No 3976/87* on the application of Article 85(3) of the Treaty to certain categories of agreements and concerted practices in the air transport sector. *Council Directive 87/601* on fares on scheduled services between member states. *Council Decision 87/602* on the sharing of passenger capacity between carriers on scheduled air services between member states and on access for air carriers to scheduled air service routes between member states.

similar distances in the United States. This has often been attributed to the shared monopolies in most markets created by bilateral agreements between member states. The whole 'liberalisation' movement started in an effort to end these monopolies and to bring prices down to a 'more competitive' level.

In May 1987, the Commission's competition commissioner Peter Sutherland threatened the 12 member state to take them to European Court for operating an illegal cartel in violation of the competition rules of the Treaty of Rome. After a meeting of the Ministers of Transport in June 1987 in Brussels where considerable resistance to change was overcome, a package was agreed that would allow some flexibility on setting fares. This was eventually adopted after several months of tough negotiations, on December 7th 1987. Under these terms the airlines were allowed to offer 'deep discounts' - between 65 to 90 percent - of the economy class fares, provided that this was accepted by the Member states. It also allowed for an increase in capacity shares on a route provided that the shares split between two countries were not outside the range of 45 – 55 percent, up to October 1, 1989 and 60 to 40 percent thereafter. Furthermore it addressed the question of access more directly by allowing multiple designation on country pairs and city pairs, while at the same time preventing one carrier in one country trying to enforce a reduction in the other country's capacity merely by reducing their own. This was an historic agreement as it had taken more than 23 years for the European countries to agree as a whole on a multilateral agreement, however minimal the legislation.

¹⁴ *Council Regulation 2407/92* on licensing air carriers, *Council Regulation 2408/92* on market access, *Council Regulation 2409/92* on fares and rates.

According to the EC Commissioner for Transport Karel van Miert in a Symposium in June 1989:

“the first phase of the package is proving a modest success. In traffic between member states, a variety of more flexible arrangements have been made - some under bilateral agreements but many stemming directly from the package...”

In the Commission's Report on the First year (1988) of the Implementation of the Aviation Policy Approved in December 1987, published in 1989, its main conclusions were:

- i. EC airlines have made good use of favourable macroeconomic trends to generate traffic increases.
- ii. Profitability has improved.
- iii. The general level of fares has followed the rate of inflation.
- iv. Bilateral capacity shares in the EC have changed little.
- v. Substantial load factor increases were experienced from 1986-1988.
- vi. the reduction of fuel prices helped the lowering of the unit cost prices of AEA carriers.
- vii. Development of new routes from the hubs to the regional airports has been favourable.
- viii. Fifth freedom routings have re-emerged significantly.

Unfortunately, the results were truly a modest success and those supporters of liberalisation expecting the emergence of lower fares among other consumer benefits were certainly disappointed. It seems that the efforts of the more conservative countries to protect their interests and to secure exemptions were

successful, since the first package contained many compromises. In fact some states went further by being reluctant to accept the implications of these agreements long after the agreeing to the package exemptions. Several cases appeared where legal proceedings were opened by the Commission against alleged breaches of the agreements.

Nevertheless, the impetus from this breakthrough culminated to the last round of negotiations on June 22, 1992 in Luxembourg where after ten years of hard negotiations, the European Community had agreed on issues that would finally create a more competitive environment in Europe's skies.

The European Commission has shown that it considers air transport as a typical example of what can be achieved by the single market. It set a final deadline in 1997 for the final completion of the liberalised market. One of the main questions being asked is how great are the likely benefits of liberalisation. If a single market is achieved without any distortions (the ideal case) using passenger revenue of EC airlines from scheduled services within Europe totalling \$ 10,8bn. in 1987 then benefits up to \$ 1bn per annum (i.e. 10 percent approx.) could be feasible.

During the last decade the EUC has ruled on a variety of areas aimed at maintaining a competitive status quo and in further enhancing competition in associated areas such as state aid and subsidies, computer reservations systems, ground handling, and the contentious issue of slot allocation at Europe's constrained airports.

The European airlines have felt the impact of the new "liberalisation" laws. To provide a buffer against the unavoidable price wars that followed the U.S.

deregulation, the European airlines began to restructure themselves, as well as their industry. Many of the internal restructuring programmes undertaken or considered by the European carriers focus on improvements in their cost structure. Corporate restructuring takes time as well as a good amount of pressure from the markets. The case of Lufthansa might be a typical example. The carrier has undergone a very substantial and ambitious restructuring process, similar to the one British Airways underwent in the mid 80s. In addition strategic alliances with other European carriers as well as U.S. carriers are being implemented. The necessary re-organisation and reduction of the workforce was one of the most difficult and probably painful process that the airline went through. In Lufthansa's case several institutional, political, and legal constraints, not directly under the airline's control made it increasingly difficult to arrive at a competitive cost structure. Nevertheless, at the beginning of 1993 Lufthansa launched a major marketing initiative, slashing prices on selective routes.

At the same time, they have sought to consolidate their domestic markets to the exclusion of other competitors and strengthen their intra-European and international traffic by forming strategic alliances operated through hub and spoke networks.

Progress has not been far reaching as testified by our route surveys. Out of 76 major scheduled intra European routes in 2001, 76 percent of them were operated by two or less airlines. On domestic routes, in 45 routes surveyed, 84 percent were flown by two or less operators.

3.2 A DIFFERENCE OF EMPHASIS AND METHOD.

When witnesses in a recent House of Commons Transport Committee Report were asked what they saw as the main difference between U.S. deregulation and EC liberalisation they replied that liberalisation would be gradual deregulation without the drawbacks. The most important drawback mentioned was the concentration of the U.S. airline industry that followed after the demise of most of its early products, namely the new entrant airlines. Some of them left the market after having failed to develop the necessary economies of scale and scope. Others were forced out due to financial difficulties resulting from being targeted by an incumbent airline or as a result of merging complementary hub and spoke networks in different parts of the country. The most recent consolidations have included the merger of airlines operating most of their services from the same airports and strengthening of the links between majors and small commuter airlines. This shows how important is an effective policy in merger control.

The EU Commission's stated gradual and incremental approach, although not yet fully proven, was intentionally designed to avoid the Big Bang approach of the U.S. deregulation. As it was acknowledged¹⁵:

".... there was neither spectacular reduction in fares nor any dramatic disappearance of the more important carriers. Liberalisation has happened in a progressive way without any major upsets."

¹⁵ Presented in an analysis of the earlier packages of reform in *Commission of the European Communities (1994) The Way Forward for Civil Aviation in Europe*, COM(94)218, Brussels.

Because of that its proponents tend to consider it economically superior as it avoided the market turbulence that followed the ADA passing. Button Haynes and Stough (1998)¹⁶ show a stylised diagram of the time paths of Big Bang and incremental policy effects. Under the former approach there are high initial costs of disruption but a rapid move to the new higher level of social welfare is achieved. The incremental approach has fewer initial adverse effects, its benefits take longer to be achieved and it is also possible for a new optimal level to be reached which is lower than that of the Big Bang approach.

Although the incremental approach gives time to the policymakers to learn during the reform process and thus introduce adjustments as necessary, it also allows the incumbents affected enough time to reorganise and consolidate their positions, forming new barriers and alliances.

Despite the problems areas within the newly deregulated U.S. market, the general agreed view is that it resulted in overall positive returns for consumers and therefore European policy makers have accepted the case for liberalising their own aviation, but in a way to avoid the repetition of the U.S. problems. For any reforms of this scale to be successful it had to be tailored and encompass all the individual characteristics of the local industry.

3.3 LESSONS FOR EUROPE FROM THE U.S. EXPERIENCE.

Since the beginning of the U.S. deregulation in 1978 several studies and reports were quick to attribute the advantages and disadvantages for airlines, benefits and disservice to consumers to the new policy. Even at this point in time, one is

¹⁶ Chapter 3, pp.56 fig.3.1

not able to declare clearly U.S. deregulation as an overwhelming success or failure.

In the case of Europe, which initiated its program of liberalisation some eight years after the U.S., a lot of attention has been given in finding ways to learn from the lessons of the Airlines Deregulation Act of 1978 and at the same time avoid the possible pitfalls it presented. The possible major lessons seen so far can be summarised as:

- There is greater choice for consumers in terms of the products available. New kinds of services, priced in different ways have provided new, imaginative and innovative ways in operating, marketing and managing an airline.
- The new entrant airlines with their lower cost bases have put pressure to the incumbents to improve their efficiency by reducing costs and by tailoring their product closer to their customers' needs.
- Added competition has in many cases deteriorated into price wars where fares were cut below costs resulting in financial instability, inadequate profitability and several bankruptcies.
- A trend has been established indicating increasing concentration of the industry with the five largest carriers developing disproportionate power that has been used to dominate the markets they served.
- As a by-product of the financial instability and the effort to cut costs, safety standards were eroded, creating the need for extra supervision by the authorities.
- The savings made from cutting costs have been transferred to the airline employees in terms of reduced wages.

The main question arising out of the U.S. Airlines Deregulation Act (ADA) of 1978 refers to the contestability hypothesis and whether this has been proved to apply to all the markets. In Europe by having the benefit of hindsight and examining the progression of the U.S. deregulated industry several questions are generated. If the hypothesis and deregulation in general has not come up to the expectations of its supporters does it mean that it is flawed or is this failure attributable to other factors? What would be the implications and lessons to be learned by Europe's intention to deregulate / liberalise its markets? All these are questions that have been asked often enough but no clear answers are available. Finding answers to the questions above, is not within the remit of this research but it should be noted that the viability of competition or not, shouldn't be judged against the extreme cases of high levels of efficiency theoretically possible in a perfectly competitive market or against the policy making of a regulator whose sole consideration is the maximisation of the economic efficiency of the industry. In the latter case which is potentially applicable in the European context other factors like supporting national interests, shielding a weak economy sector and the case of several state owned airlines, will dilute policy making goals. What is important to the viability of deregulation is that a workable level of competition is achieved so as to create an environment within which deregulation can be propagated and sustained for long enough as to enable adequate structural reform in the industry itself.

3.4 BASIC ISSUES

In the early stages of the formulation of the need for competition it was important to examine whether competition was possible in this kind of market or whether the market was readily monopolistic. Considering the fact that some large airlines have costs not lower than smaller ones indicated the lack of scale economies, suggesting that the market was naturally competitive. However this has proved to be a false premise.

One of the peculiarities encountered with Europe's attempt to liberalise its air transport industry is the need for the Commission to empower and co-ordinate all member states to adopt the new philosophy. The difficulties seem to arise from the fact that in some cases airline businesses enjoy special characteristics that make it necessary to maintain some degree of governmental control to ensure that adequate services are maintained. These governments pointed to the public and consumer interests that would not be served by a free market environment. Also they used the example of the U.S. case to support the view that deregulation leads to chronic instability of service and disruption of essential operations. In answer to these points they proposed that some sort of entry regulation should be imposed to any future environment to assure adequate levels of profitability in an industry which by its nature, has very low natural barriers to entry. A brief overview of the progress of U.S. deregulation is provided here in the form of three phases that the industry went through.

- i) In the first phase new entry was easily facilitated by the new legislation and occurred readily. It produced a plethora of new carriers seeking to compete in markets both new and already served by majors or trunk carriers.

ii) In the second phase, by 1987, the cut price competition had ceased because by then the market had filtered out the low cost carriers responsible for the cost cutting and the price wars. Accordingly, the airlines' yields and financial results for the year showed marked improvements, resulting from the new order of oligopoly that had been imposed. It was uncertain however whether this new stability would be a long term one or whether it will be at the expense of the consumers.

iii) In the third phase, from 1987 onwards the airline industry became even more concentrated as signified by the fact that the eight remaining majors were responsible for 94 percent of the domestic traffic. This phase is characterised by a period of mergers and take-overs and possibly the most significant industry development: the emergence of dominant carriers at major hubs having more than 50 percent of the total traffic at those hubs.

This oligopolistic concentration has come as a surprise to the advocates of airline deregulation, who used the theory of market contestability as a basis for their argument. More specifically the widely acknowledged 'father of U.S. deregulation' Alfred Kahn (1988) admits that ' the most unpleasant surprise has been the reversal of the large scale entry of new competitive carriers, the departures of most of them, and the re-concentration of the industry both nationally and at the major hubs '. He also accepts that deregulation advocates were '...misled by the apparent lack of evidence of economies of scale, differences of the route structures and...underestimating other obstacles to entry'.

3.5 EU DIFFERENCES

There are marked differences between the European and U.S. air transport market structures.

3.5.1 Domestic / International nature

The European market is essentially an international one. In 2000, 66.5 percent of the AEA's passengers were on international services, 45.6 percent carried were intra-European, and 33.4 percent were purely domestic (within the borders of the same country). Ever since the end of the war Europe's airlines were of an international nature as even in the larger countries the majority of their routers were outside their own borders. International routes subject to the international bilateral agreements carried a considerable economic rent.

On the other hand, European geographical differences from the U.S., being a larger population in a small geographical area, causing lower stage lengths has historically had competition from a heavily subsidised railroad system. Furthermore, a very competitive charter industry, devoid of any regulation on fares and capacity restrictions, has captured considerable amounts of traffic during the peak holiday season, further reducing the main carrier's market share. Competitions from other modes of transport i.e. rail and car, particularly over the shorter sectors tends to reduce the density of travel between point to point.

All these features of the European market when put together suggest that demand-side benefits from liberalisation at first would be smaller because, at

least in theory, the airlines would be more competitive than their U.S. counterparts.

3.5.2 Airport infrastructure

European airlines do not have anywhere near the airport dominance in their main hub airport that their U.S. counterparts possess. Good Röllner and Sickles (1993) suggest that as the intra-European network grew from within the bilateral regulation system the bilateral negotiations undertaken by the respective governments led to more rational pre-liberalisation networks for the major carriers. In contrast to that it can be argued that some of the more anti-reform minded governments have tried in effect to maintain the status quo as far as possible, shielding their carriers and even going against liberalisation as much as possible. European carriers usually have a single major hub in their largest city or capital (except Germany due to the partition of Berlin), and possibly a secondary one in another important regional capital. They have nowhere near the monopoly of U.S. carriers in terms of both slots and passengers, do not own or control gates and terminals but are provided by agreement by the airport authority. Intensity of operation is also lower since it is not possible to create the banks of departures and arrivals unless the traffic density or slots pre-exist. Because of the geo-economic factors above indirect trip routings within Europe via a hub would place a heavy time penalty on the more time sensitive business traffic which is importantly of a higher yield.

In the U.S. because of the CAB's route allocation policy individual hubs have been chronically associated and dominated by a particular airline. With greater

consolidation in the last fifteen years the numbers of hub dominant airlines has decreased and the hubs they dominate have increased. Such a development will be impossible to replicate in Europe in exactly the same manner. The only possibility would be solely on an alliance level where alliance member flights from a single hub are counted as one.

3.5.3 State subsidies

By the end of 2000 out of 32 major European airlines 12 of them were still under government ownership or control. Airlines under government control is a result of the agreements after the 2nd World War where governments saw the airlines as a projection of the national prestige and security outside their borders. Although in the intermediate years the reasons for maintaining airlines in state control have become more political, the economic facts have always confirmed that private ownership would be a better manager for any airline. Fig 3.1 has shown the amounts of state subsidies given to European airlines in the variety of forms that were allowed under the provisions of the EUC regulations on state aid. As has been discussed already although subsidies have been given with the specific purpose to restructure the airline in reality have helped to maintain poor performances. Several studies amongst which those by Alamdari and Morrell (1997), have shown that labour unit costs, and productivity of EU airlines have been reducing by up to 23 percent in 1991-94 but only mainly due to fast growth in productivity increases. In the earlier years from studies by Windle (1991), Encaoua (1991), it was shown that they are lagging behind the U.S. and a selection of other world airlines. The worst cases were state airlines receiving subsidies.

4 PREVIOUS THEORETICAL WORK

4.1 *INTRODUCTION*

The viability of competition shouldn't be judged against the extreme cases of high levels of efficiency theoretically possible in a perfectly competitive market or against the policy making of a regulator whose sole consideration is the maximisation of the economic efficiency of the industry. In the latter case which is potentially applicable in the European context other factors like supporting national interests, shielding a weak economy sector etc. dilute policy making goals. What is important to the viability of deregulation is that a workable level of competition is achieved so as to create an environment within which deregulation can be propagated and sustained to produce beneficial welfare gains.

In the early stages of the formulation of the need for competition it was important to examine whether competition was possible in this kind of market or whether the market was readily monopolistic. For the market not to be monopolistic then ease of entry and exit should be case.

As far back as 1950 it was predicted that the ease of entry would influence the performance and competitiveness of the industry. The opinion expressed was that with ease of entry, established firms would be forced to set prices well below the monopoly levels in order to prevent entry of a competitor. With the same hypothesis in mind they might alternatively, in the short term, set monopolistic price levels until just before the point actual entry occurs, when they will revert to a lower price setting, having accumulated monopolistic profits.

A model developed by Baumol and Willig (1981) investigates the effects of various types of barriers to entry with firm pricing. He states that if entry and exit costs are zero then even a natural monopolist will be forced to set prices at the zero-profit (absolutely competitive) level. When a market has these attributes then it is called 'a contestable market', which invites deregulation, even though it might be a naturally monopolistic market. This is the theory behind the decision of the CAB to proceed to full scale deregulation without any transition period.

4.2 E.U. DEREGULATION

Research carried out has attempted to provide a way of measuring the potential for price reduction if competition increases within Europe, while holding the cost constant. Could it be found that there is a sustainable price reduction possible for the European carriers, given their existing costs? If European carriers did not enjoy significant monopoly rents in the pre-liberalisation period (1980-1990), it is unlikely that more competition will allow them to lower prices much in the short run. In that case it would be expected for prices to move downwards as efficiencies and costs improved. Thus, potential benefits from liberalisation could be primarily realised through increased efficiency. Research carried out can be broadly grouped in the following categories, which will be analysed more closely below.

4.2.1 Airline Efficiency

There have been several studies examining airline efficiencies in a deregulated market. Most studies have tried to calibrate the economic performance of

European scheduled airlines via an international comparison, the most common being with U.S. deregulated airlines.

Röller and Sickles (1994) use a model of the European airline industry to estimate the existing price cost margins and simulate the effect of increased competition. Their model uses the carriers home market, as a protected niche and an unprotected inter European route market where competition exists to a greater extend.

Their initial hypothesis was that if European carriers do not enjoy significant monopoly rents pre-liberalisation, then it is unlikely that more competition will allow them to greatly lower prices. They find that with increased competition there would be little scope for dramatic decreases in prices, due to long run factors such as physical and human capital investments. At the same time they identified monopoly power in domestic markets. These results combined with European carriers' substantial cost disadvantage against U.S. airlines indicate that the benefits of liberalisation will be achieved very gradually only as a result of increases in airline efficiencies and the abolition of market niches.

Further evidence of the effect of these long-run factors is provided by Captain (1994) who uses a dynamic industry model to simulate and solve for optimal efficient levels in the 1976-1990 period. This approach analyses the long-run strategies of the firms and simulates the optimal profit maximising levels for different scenarios. Like others he identifies high labour market rents, lack of economies of densities, and direct and indirect subsidies to airlines as main causes for the inefficiencies and high prices in the European airline industry.

More specifically, for the European market Stötzer (1989) has investigated the combination of efficiency and prices in Europe. Considering that the primary condition of neo-classical firm theory dictates that managers will seek to maximise their firm's profits, by allocating efficiently the factors of production if the input and output prices are determined by competition within the market. If competition does not exist, then this will cause managerial collusive behaviour leading to the inefficient use of resources, capital and labour and resulting in prices above their competitive economic levels. This premise is investigated through productivity differences in terms of output per employee and prices charged, carried out via comparisons with the U.S. industry. His findings are that the marginal price for a statute mile flown in Europe in October 1987 is *'...about twice the figure for the USA' (206 percent higher), and the mean labour productivity of the European scheduled airlines are about a third below the mean of their U.S. counterparts'*.

He also notes that the fare structure encountered during his investigation were similar to that of the USA during the regulation era.

4.2.2 Industry structure

One different approach investigated frequently in the literature is that of modelling the structure of inter European competition under various scenarios. Nero (1994) studies the effects of competition within European routes for two airlines employing a hub and spoke network operation. He examines a two country / two airline model enjoying domestic monopolies and sharing a common route between their respective main hubs. The main competition

scenarios applied varied from the purely collusive cartel scenario to the competitive scenario reflecting a fully liberalised market after 1997. His findings suggest that under 'the collusion scenario' the domestic segment traffic is larger than the hub to hub segment traffic, or conversely, output or traffic is more restricted under collusion than it is under monopoly. Also traffic connecting domestic periphery cities through the main hub will be better off than traffic from domestic point to the foreign hub via the connecting hub. As a result, the traffic along the shared route, i.e. intra – Europe, will be more restricted and more expensive.

Under the 'competitive scenario' where the airlines compete on the common hub to hub route, the traffic on the intra – European segment is larger than on the domestic segments, and therefore has a lower price. Furthermore, the competition on the intra – European segment will increase traffic in all other markets, benefiting all network passengers. This makes intra – European competition necessary, particularly when airlines operate hub and spoke networks and of more importance than the encouragement of new entrants.

In response to the recent trends within the EC airlines to form strategic alliances, in lieu of full mergers, it was found in comparison to the 'competitive scenario' the 'merger scenario' does not increase traffic more than under the 'competitive solution' and poses no threat as it functions similarly to the former in the non intra – Europe market, provided there are sufficient increasing returns to density.

Button (1996) restarts the debate in the U.S. during the early 80s when the airlines were suffering big losses by asking the question whether a deregulated scheduled aviation market is likely to be viable in the long term or whether it

possesses inherent characteristics which when increased competition is applied will prove destructive. Citing the examples of the early large losses in the U.S., the market concentration which followed it, and the developments in the Canadian and Australian markets as unwanted alternatives for Europe, he points to the recommendations of the Comité des Sages (1994) as implicitly recognising these possibilities.

The theory of a core proposed is the notion, used to show if competition can be unstable and inefficient by not achieving the optimal results. If an empty core exists it signifies a lack of competitive equilibrium and an inefficient allocation of resources. Testing for an empty core, he concentrates on two types of considerations, those of market entry and cost and demand. For the former, data relating the share of passengers between city pairs of EU member capitals were used to check if collusions in European aviation are due to an empty core problem, which were not conclusive.

For the latter consideration, on the cost side, he evaluates if cost characteristics such as increases in marginal costs due to technological restrictions of the equipment, or marginal costs rising early before the full aircraft capacity is achieved are relevant to the empty core notion. In terms also of economies due to traffic densities in hub and spoke networks and the inflexibility such type of operations entails, an empty core situation is probable when there is intensive equipment utilisation.

For the demand side, variability in demand negates the gains of competition. The methods the airline use in responding to market fluctuations by lowering prices to their short run marginal costs creates an empty core because these prices are not sufficient to cover the full costs of operating their schedules.

The cyclical variations occurring are also consistent with the core hypothesis. Although the testing of the indicators of collusive behaviour to predict with certainty the existence of an empty core did not provide the sufficient empirical evidence it nonetheless remains a useful tool for policy makers in deciding where to draw the line between allowed co-operation and unwanted collusion between airlines.

Marin (1995) treats airlines as firms producing a variety of products, with each route being a different product. As the cost structures, quality of service and the set of products on offer change for each airline firm then the intra route heterogeneity (differences) of their characteristics could hold the explanation for the different market shares and prices offered. This type of model tries to explain the firms' behaviour in the air services market, market demand for their product and the corresponding pricing policy. A control group is used so as to clearly identify and isolate the effects of the liberal ASAs. In addition to the above it takes into consideration the effects of the long term domination by incumbents of the airport facilities and other ancillary services i.e. ground handling. The introduction of liberal bilateral agreements has given rise to increased competition in price and quality from both new entrants and amongst incumbents but at the same time greater incentives to improve efficiency have also been generated. Hence firms try to increasingly exploit their cost advantages arising from areas such as airport facility control, slot rights control, CRS ownership / participation, scales of scope and density. Overall, this looks quite promising.

The findings of the model analysis show that during the deregulated period there was a lower or negative growth rate of business and leisure fares, on routes with less traffic volume where price competition has been less intense, market entry has been greater. Flag carriers' market shares on routes with less traffic have fallen significantly, while price competition on heavily travelled routes has restricted frequency growth as carriers introduce larger aircraft to reduce their unit costs. Increases in traffic growth to a greater extent than warranted from the population density has been a characteristic of liberalised routes.

Overall, entry and competition follow liberalisation of routes. As a result, firms try to exploit their cost advantages and some new competitors have initially consolidated their position in a more fragmented market. Emphasising perceived and actual market presence and exploitation of incumbency advantages is the way flag carriers maintain a high market share. Advertising intensity, and changes in strategic policies are also ways used by incumbents to ensure a long term market share lead. The liberal bilaterals are able to initially achieve greater competition, but on their own are not able to maintain a fully competitive environment in the industry as the control of airport facilities and services exercised by the incumbents could be enough for preventing the whole industry realising its full competitive potential.

Further evidence on the condition of the barriers to entry and exit of the market can be gathered by observing the managerial attitudes. Schnell (2001) observes that exit barriers can play a role just as important as entry barriers. Despite the lack of empirical evidence in this area and the existence of just a few theoretical studies on this subject, he uses a questionnaire sent to a variety of

airline managers to canvass their views on the importance and effectiveness of exit barriers.

His findings first of all confirm that exit barriers are indeed present in each route exit consideration, irrespective of the scale of this exit. The main factors preventing exit are in order of importance: feeding of main routes, exit of competitor, and the prospect of improved profitability. These factors in fact negate the contestability theory. Contrary to what has been suggested, the existence of sunk costs plays no part at all in the exit decision, because managers considered them a spent resource. Accordingly, although the prospect of paying compensation to laid off employees is considered unimportant, the human aspect of the action of making employees redundant does play a significant role. The perceived attitude amongst larger airlines is that strategic barriers are more effective than small carriers, making them more likely to continue serving an under performing route.

It appears from this survey that some correction of the accepted theory should be considered because it has overemphasised sunk cost as important barriers while overlooking the interrelationship of routes, an important aspect of any network airline operation, as valid and effective exit prohibition.

4.2.3 Airports and competition

With air travel market projected to grow at 4 percent a year and with a fully deregulated market an era of competition between airports has been introduced. The bilateral system of international regulation which allowed the more conservative or high cost airlines to prevent any innovation from a dynamic

airline has had a similar effect on the airports. Airports whose clients were non-competing airlines were able to transfer their extra cost onto them with great ease. The cosy relationship between airport and client airlines was further enhanced by the restrictive slot system, which allowed the airlines to establish control of hub airports. For many countries in Europe airport management and operation was usually seen as a distant function of a government department, rather than the separate major business, which it was becoming.

With the advent of new entrant low cost airlines who in their efforts to provide the cheapest fare to the consumer have kept away of the main airport and their high servicing costs and have searched for alternatives where this share could be minimised. Although other reasons apart from the high cost of the traditional airports were responsible (slot availability, counter space and handling) “...about 45 percent of their operations are at airports with no or little service by the main line carriers.” (AEA 1999)

The traffic generated by the low cost new entrants at these underused alternative airports has propelled them into very high market share percentages for the routes served.

Barett (2000) studies the economics of competition between airports in Europe as a result of airline deregulation. Initially examining the reasons leading to airport privatisation in the UK he is critical of the privatisation of BAA as single entity, because it placed the airports owned in a non competing environment other than through BAA itself. The arguments about the viability of building and operating of airports due to economies of scale, offered at the time in the White Paper on airport privatisation, are considered debatable and questionable in the light of subsequent developments.

The quickening of the pace in EU liberalisation has lead to service competition between airlines. Falling airline fares have put considerable downward pressure on airport charges, which in many cases established airports were not able to deliver to their clients. The manner in which the commercialisation and privatisation of airports in the UK has been carried out has prevented the full competitive forces to prevail. Instead their profitabilities such as BAA's have exceeded by almost three times the return on investment of its clients [Borgo and Bull Larsen (1998)].

Having looked at airport charges of 37 European airports and the impact of low cost carrier operations for the routes used by Ryanair from Ireland and the UK, concludes that airport competition is sustainable and is essential to start and maintain this latest dramatic stage of deregulation. Provided policy makers do not impose artificial restrictions on the growth of these airports the gains to passengers from reduced fares, increased choice and better suitability will provide a completely deferent environment to the lethargic past.

Parker (1998) closely studies the performance of BAA before and after privatisation. Using a data envelopment analysis (DEA) whereby the relative efficiency of a set of decision making units (DMUs) he measures the technical efficiency before and after privatisation Although he considers that one disadvantage of the DEA method over time is that intend to favour later DMUs over earlier DMUs it is likely to be biased in favour of confirming improvements. Despite this his results find no evidence that performance improved, or that privatisation had any beneficial effects. When he examines the performance of individual airports within BAA and compares then with 16 other independent airports in the UK he finds that with exception of good

performance from Heathrow, Glasgow and Edinburgh the under-utilised Stansted and Gatwick were poor performers. Additionally he comments that Government regulation may distort incentives to be efficient and the Government 'golden share' shields BAA's management from the threat of take over.

Berechman and de Wit (1996) also looked at the issue of airport competition but from the airline's point of view. Examining data for the five largest western European hub airports (Heathrow, Schipol, Brussels, Charles de Gaulle and Frankfurt) they assess their potential to become primary getaway hubs, given a fully liberalised and competitive market. For a profit maximising airline facing potential entry in a competitive environment, a suitable hub airport must be selected which will allow it to exploit all of the microeconomic elements of airline behaviour under deregulated market conditions. Using a database of 20 airlines and 26 O-D cities in the 1986-91 period, potential profits were calculated for each airport in terms of the airline's output in passengers, frequency, and load factor and route fare for each airport case.

The results obtained showed that London Heathrow followed by Brussels gave the highest profit potential and would be the prime candidate for selection. Given however Heathrow's lack of runway capacity Brussels is the real choice. Frankfurt scored a negative value indicating the large airport charges it imposes. Two other scenaria were investigated (ranked third) were lowered by 60 percent and where Schipol's charges remained 60 percent lower but Heathrow's increased by 20 percent.

In the first scenario, Heathrow still came top, but Schipol beat Brussels into second place. Under the last scenario, Schipol came top, Brussels second and

Heathrow third. This type of sensitivity test was initiated to try to distinguish if the price setting of airport charges is an appropriate mechanism of attracting airlines. The results were inconclusive because the sensitivity of the reductions seems to be low, causing great difficulty in achieving these high rates of discounts. Also, the selection of a primary hub is a combination of many other equally important factors, slot availability, runway capacity, location, airport quality, availability and cost of labour being some of them.

4.3 THE EFFECT OF LIBERALISING AIR SERVICES AGREEMENTS (ASAs)

As seen earlier the gradual relaxation of the regulatory regime within the European air transport sector and the introduction of the first liberal bilateral agreements, although not centrally orchestrated, on several European air routes has been the first important step in European airline deregulation. Traditionally, European aviation has been regulated by highly restrictive bilateral Air Service Agreements (ASAs). Each route was served by the two national carriers of that country and they used to jointly set a single price and evenly split the demand. In the absence of entry of any competitors, and with capacity and price agreements, competition is not possible and the industry was characterised by a lack of incentives to improve the efficiency characteristics and consequently the product itself. In addition, generous subsidies received by their respective governments meant that costs were being allowed to increase inefficiently, sometimes aided by the pressures brought on by powerful professional associations.

During the eighties, some changes started taking place. Firstly, as the disposable income of people grew, there was a boom in the demand for charter services (not subject to regulation) which supply holiday routes. Secondly, following the passing of the American Airline Deregulation Act, the U.S. adopted an 'Open Skies' policy, encouraging competition on domestic and international routes, effectively exporting its competitive regime to others across the Atlantic. Several European countries had to re-negotiate their own ASA with the U.S. as a result. Some European governments followed this example for intra-European routes as well.

In 1984, the UK and Netherlands pioneered the first such liberal bilateral agreement; others followed soon afterward e.g. UK-West Germany (1985), UK-Belgium (1985) and UK-Ireland (1986). Entry and price reductions were now possible, allowing for more competition and causing the first casualties in the market.

This preparatory period was unique for the European market and was an example of how an introductory period was introduced to markets of countries whose flag carriers felt secure enough to undertake such a change. The European Commission cannot take any of the credit for this however as due to the fragmented aviation system of Europe it was down to individual countries' authorities to try to introduce changes in their respective bilateral treaties. A similar period was not possible in the U.S., which decided to introduce competition very abruptly. However there was a period from mid 1978 until 1981 where the forces of competition had not completely taken hold of the industry as the airlines needed some time to adjust to the new environment.

There was good reason to expect that the introduction of liberal bilateral agreements had given rise to greater competition both in price and in quality, derived from either new entry or increased price competition amongst the incumbent carriers or a combination of both. Furthermore, these agreements provided the added incentive for firms to improve efficiency by taking advantage of their cost advantages (e.g. lower unit costs and larger economies of scope). Alternatively, firms found it more profitable to improve their product's perceived quality (usually through advertising campaigns) and, in any way to raise barriers to new entrants. Typical examples of such barriers are advantages derived from the control of airport facilities, ancillary services, computer reservation systems, Frequent Flyer Programmes, advantageous allocation of airport slots at their home airports, to name but a few. New entrants usually have to penetrate the market if they enjoy a cost advantage, such as lower wages, that allow them to offer a lower price.

Research in this area already carried out by Encaoua (1991) extends earlier work carried out by Forsyth, Hill and Trengrove (1986), mentioned earlier here and provides strong evidence on firms' differences on cost structure and productivity. Evans and Kessides (1993) showed that in the U.S. market intra-route firm's differences explain most of the variation in prices set. Here evidence of the value of the incumbent's advantages mentioned above can also be found. One notable point that also emerges in McGowan and Seabright (1989) and Encaoua (1991) is that new entrants pay lower wages because they have not suffered from the bargaining power of professional associations under the regulatory framework imposed earlier on.

In particular Encaoua (1991) tries to explain the difference in attitudes to increased competition between airlines in Europe, by examining differences in costs and global factor productivity amongst European national flag carriers. Initially he identifies the pressures that lead to the introduction of change in the European regulatory framework: Charter companies using their low fares to invade the holiday routes, the export of U.S. domestic deregulation into European routes, and the effort by the Commission to introduce flexibility and competition in the system.

For the first time Europe is divided in three zones comprising of the South (Spain, Portugal Italy, Greece) the Centre (UK, France, Germany, Benelux) the North (Scandinavia), and the type of traffic to each zone is distinguished i.e. mainly leisure to the South and business orientated to the North and Centre. Airlines from the South who are already in competition with charter carriers oppose any possible increase in competition. Added to that is the background of these airlines, which are all state, owned and which over the past years have been heavily subsidised by their governments leaving them unable to compete economically with the others.

Flag carriers from the North fear full deregulation due to the restructuring of the route networks it would bring about, namely the 'hub and spoke' system which due to their geographical location would cause the disappearance of their own hubs and transform them to 'feeder' or regional carriers from the periphery.

Countries from the Centre are divided. Because of their dense and sophisticated surface transportation system which is seen as a sufficiently competitive alternative mode of domestic transport they are against domestic deregulation

but in favour of moderate and gradual liberalisation on the European level. Clearly, this variety of attitudes is underpinned by economic reasons. The approach to analyse them is through the examination of differences of costs and factor productivity between the carriers.

He finally concludes that: the starting initial conditions were so remote that the European Commission was right in trying to introduce a gradual reform policy. It seems that factor productivity trends bring nearer the relative competitiveness of different European carriers even if important differences in factor prices remain. The more flexible and gradual reform policy exercised by the Commission has played an important role in the process of adjustment.

4.3.1 The impact of the liberal bilateral routes

Abbot and Thompson (1991) analyse the impact of the liberal bilateral routes by comparing UK routes with a control group where no liberalisation has been allowed and finds that the new ASAs have indeed given rise to competition. Examples of the leisure product routes, those to Ireland and the Netherlands and the fully regulated routes were used for comparisons. In general, however they support the hypothesis that the restriction of competition does result in loss of benefits to the consumer which could be substantial depending on the market.

Further more absence of entry in predominantly business type routes and insignificant fare price changes indicate imperfect competition. The advantages conferred to incumbents on these routes such as brand loyalty, Heathrow access, and interconnecting networks are mainly responsible for the

imperfections in competition, but also suggest advantages from a multilateral liberalisation approach. Hence there should be considerable advantage to liberalise those currently under restriction.

4.4 NEW ENTRANTS

As discussed earlier, Southwest Airlines has been the most successful low-fare airline since deregulation. While Southwest gradually expanded its service area becoming a “major” airline in 1991 by DOT definitions several other new airlines began offering low-fare service. Following a dearth in start-up airlines and a recession that dampened air travel demand in the early 1990s, new entries surged again. More accurately, out of a total 88 jet operators formed in 1978, 83 failed, and an estimated 164 ‘paper airlines’ never got off the ground. Of those that survived only 26 of them operated for 3 more years. In investigating the reasons behind the inability of the new entrants firstly to enter and then survive, particularly in the post 1987, post deregulation era, there have been two main studies with differing approaches.

4.4.1 New entrant life cycles

Rakowski and Bejou (1992) employ life cycle analysis to examine the dynamics of competition and of the airline industry in general and how the new entrants’ life cycles are analogous to that of the biological (birth, growth, maturity and death). The paper also identifies a stage coined by Wasson as ‘competitive turbulence’ being a period during an increase in consumer demand for a service in any deregulated industry. This stage occurs before the maturity stage of the life cycle and firms finding themselves in it resort to

battles for market shares. The stronger firms survive, entering the maturity stage whereas the younger and less experienced firms either merge or fail or go directly to the market decline stage.

The individual milestones of the biological life cycle have been matched with the milestone years in the U.S. deregulation period.

Combining airline data from these years the passage of the major airlines is charted through all these stages and a quick evaluation is made as to which way they are going. Taking into consideration other exogenous factors such as Hub airports, FFPs, and infrastructure constraints, they predict that when the industry life cycle reaches full maturity there will be between three to six very large nationwide or international carriers, complimented by up to six smaller feeders or regional carriers, competing with the large carriers only to small extent.

A different approach is taken by Gudmundsson (1998b) by using the actual type of airline before 1978 to match it to the appropriate life cycle stage.

By using a 3 dimensional life cycle model the evolution paths of these airlines is tracked in terms of revenues generated and profits achieved as they grew from a small carrier. Separating the airlines into new entrants, charters, intra-state and regionals before 1978 would allow the replication of this investigation for the European airlines although because of the later stage of liberalisation more data would be needed. Prime examples for this would be the cases of Dan Air, Air Europe, Air UK, British Caledonian, Virgin Atlantic, and British Midland, as well the latest low cost operators like Ryanair, EasyJet and Debonair.

The evolution path approach has the advantage of allowing greater flexibility than other size classification schemes. The evolutionary path has been divided into three distinct phases: the new entrant, the transitional and the interim-major phase.

In the first one containing carriers with low costs and motivated staff, placed emphasis on market presence or niches. In the second stage the carriers have increased complexity, and as they grow out of their niches, need broader market scope, more planning emphasis, and higher systems integration. The last stage contains airlines becoming more traditional, focusing on customer retention, existing markets, cost and debt reduction as they dissipate their cost advantage.

The research indicates that there are similarities in the characteristics of new entrants' evolutionary stages and life cycle phases which were independent of geographical location. Beyond that there are significant differences between evolution stages. Accordingly, airlines follow the more general life cycle patterns of firms in other industries.

4.4.2 Effects of new entrant entry

According to the contestability hypothesis the incumbent airlines were the possibility of new entry. The impact of a new entrant entering a market has been well documented in a variety of studies. In the cases of new entry by People Express, between 1984-85 a mean drop of 34 percent in fares has been observed. The wave of consolidation that followed severely threatened the

existence of such carriers with one notable exception, Southwest Airlines (SWA) which has continued to grow constantly.

The paper by Dresner Lin and Windle (1996) updates past research in this field by looking at the economic impact of low cost entry to carriers operating on other routes at the airport where entry occurred and on carriers operating on other nearby competing airports.

Using the typical low cost airline SWA they analyse the competitive effects of entry onto routes from Baltimore Washington International (BWI) airport. This was a significant event as it marked this carrier's entry into the U.S. East Coast market for the first time. The adjacent airports to BWI were the capacity constrained Washington National (DCA) and the Washington Dulles (IAD). The entry of SWA into the BWI – Cleveland and BWI - Chicago Midway routes yields to fall and passenger traffic to rise dramatically not only on the routes that SWA entered but more significantly on competitive routes in adjacent airports and on other non SWA routes out of BWI. In fact fares at BWI fell by approximately 35-40 percent. The so called 'halo' effect was even more pronounced if more than one competitive route was served by SW or similar airline. The corollary from this confirms that the presence of low cost carrier on a route has a positive spill-over effect onto other competitive routes, provided that there are alternative airports within close proximity [Greig (1987)].

4.5 PRICING OF SERVICES

Low cost airlines have based their philosophy in providing a 'no frills' service at extremely low fares. As mentioned earlier executives of low cost carriers have been quoted to say that they calculate their highest fare to be not more than half of the equivalent main line carrier economy fare. These produce some extremely low fares where in some cases if the taxes are deducted only a single digit fare remains. These are the fares that are widely advertised in order to attract new passengers to these routes.

The question that arises from this is what happens when traffic grows or during peak traffic periods. A study made by Bishop and Thompson (1992) examines the decision making process on pricing and the allocation of resources for the charter market between UK and Europe. This question is of interest to low cost operators because the economics of the two types of air travel are closely related. Although UK charter airlines have a majority of routes from the slot constrained London airports, low cost airlines have so far operated from unconstrained airports. However to a certain degree they use such airports as their European destinations.

Using a peak load pricing method the high demand for air travel can be simulated to show the level of fare setting. Factors who will affect this include congestion in air space capacity, airport capacity constraints and their associated premiums, the direct aircraft operating costs route length and traffic density.

The results obtained show that charter air fares do reflect the underlined costs of different routes and conform to the peak load structure. Increased prices during week ends and summer months are typical examples. Fares from capacity constrained airports are higher by around 5 percent despite the below market airport charge setting applied to UK airports.

From existing data of the way the low cost airlines set their fares it is obvious that they are already conforming to changes in costs and demand. Increasing queuing due to delays might have detrimental effects operationally for the airline but the fall in service quality should not affect low cost airlines' demand to the same extent as for main line carriers. The low fares offered by these carriers seems to mimic charter operations where most passengers are less time sensitive leisure travellers, have no alternative bookings for the same route and their service expectations are lowered by the savings they make.

Having examined similarities between the low cost carriers and the charter sector it is now appropriate to also examine recent trends reported by a number of EU airlines. Recent research has indicated that for the first time business travellers form a small part of low cost airline passengers. The study by Mason (2001) examines whether business travellers using low cost airlines are a different market segment than those using mainline carriers or that the low cost airlines have captured some of the traditional full fare business travellers.

The results obtained show that there is no clear cut separation between the two market groups. The low cost airline business travellers tend to belong to smaller companies, they predominately book their own tickets directly and

placed greater importance on punctuality, frequency and price. Main line business travellers tend to belong to larger sized companies, booked their tickets via a secretary and a travel agent, had mostly never used a low cost airline for such a trip but 79 percent of them that business class service did not offer value for money on short haul trips, but placed greater importance to punctuality, frequency and in-flight level of service.

Some of the low cost airlines have begun to take account of this type of traveller by using business travel sales teams trying to negotiate route deals with companies where possible and by offering business lounges for a small charge on a 'pay as you go concept'. Likewise the network carriers have realised that their small and medium sized business travellers are becoming increasingly price sensitive and are restructuring a business product for the lower end of the market.

For the low cost airlines the consistent traffic provided by the business traveller will be critical in sustaining the traffic levels during the off peak periods, and allow the airlines to maintain adequate revenue stream through these periods.

PART II

5 ECONOMIC FORECASTS AND CHARACTERISTICS

5.1 *ECONOMIC ANALYSIS*

5.1.1 Forecasts Of The Future

Within the new economic reality of the 1990s and the new millennium, the air transport industry is having to adapt to changes in the economic and socio-political environments. Particularly in the U.S. and to a large extent in Europe successive governments have shown that they are willing to re-appraise the policies under which society's resource allocation decisions are being made. In general the role of the state has tended to restrict itself to fewer functions and to allow market forces to have much freer rein in many sectors. This, has naturally led to states divesting themselves of interest in the national state owned airlines and privatising them. Nevertheless in air transport there is a long way to go before this becomes the general rule.

5.1.1.1 *World Forecasts*

There are two principal drivers that influence travel demand. Declining airfares in real terms (i.e. adjusted for inflation) and impact of increases in economic growth. The former factor can be attributable in the major technological developments such as the continuously improvements in aircraft productivity. At this point however these are mostly historical. Aircraft manufacturers have managed to squeeze out as much performance and improvements in operational economics out of the current types. Even the new planned super jumbo,

estimated to have capacity of at least 550 people will not add a substantial increment to what has already been achieved. As the former factor declines in the foreseeable future the impact of economic growth will become even more important.

Rengaraju and Arasan (1992) identify two possible methods of air travel demand analysis: macroanalysis and microanalysis. The former is concerned with system-wide air transportation activities whereas the latter with more specific city origin-destination flows. Calderon (1997) follows the widely accepted trend to separate the demand drivers into geo-economic factors and service related factors. In the literature the consensus is that geo-economic factors include commercial, industrial and cultural activities the most important of which are income and population. Fridström and Thune-Larsen (1989) and Rengaraju and Arasan (1992) agree with this. In Calderon's (1997) model demand is directly influenced by: population, income, productive structure, distance, relative proximity, fare, frequencies aircraft size and opportunity cost to use the best next alternative.

Holloway (1998) identifies the following macroeconomic variables that affect airlines:

Economic growth as tracked by world GDP trends, trade, and industrial output measures. Overall growth in air travel correlated closely with world gross domestic product, although air travel shows considerable volatility, but is forecasted to remain positive over the next two decades.

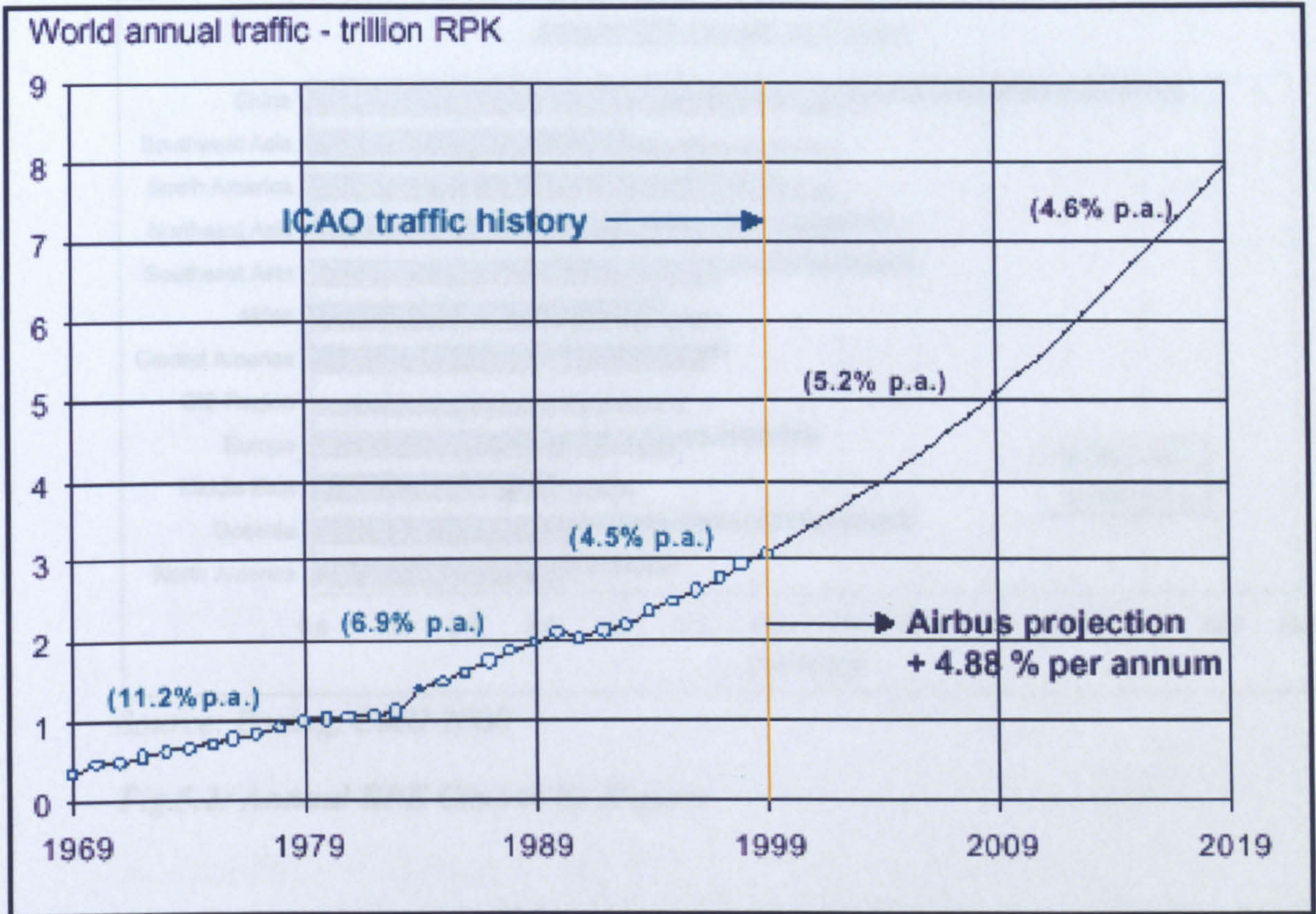
Economic and industrial structures dictate the nature and direction of traffic flows.

Economic and industrial policies influence the role that governments will play in terms of economic restructuring, regulation etc. Currently there is considerable optimism in this area as the tendency is for governments to allow market forces and the price mechanism to unleash previously suppressed demand potential.

Other economic indicators include inflation, factor prices, exchange rates, national foreign indebtedness.

Capital availability is very important to allow airlines to finance future growth. Important in both short and long terms. Recently, because of the industry's poor profitability and huge losses in the early 1990's the focus was shifted from aircraft financing to airline financing. With the progress of further restructuring under way it is foreseen that financing will need to be 'earned' by competitive performances in the marketplace.

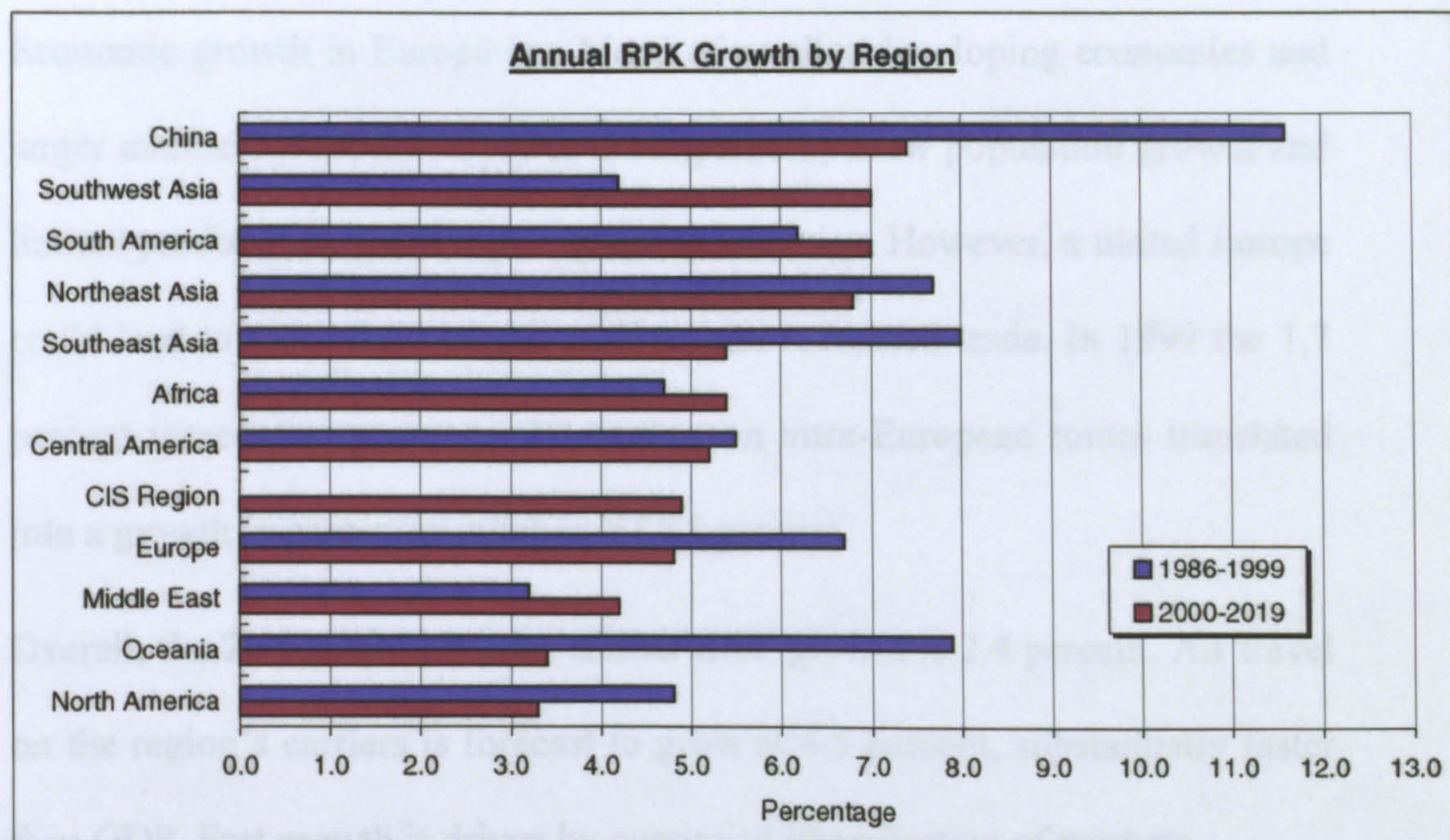
According to the Airbus forecast (2000) between 1999 and 2009 world annual traffic is due to grow by about 5.2 percent per annum. Growth will slow as markets mature, to average 4.6 percent through the following decade, resulting in a twenty-year average annual RPK growth of 4.9 percent through to 2019, when the airlines will be generating 160 percent more RPKs than today.



Source: Airbus GMO (2000)

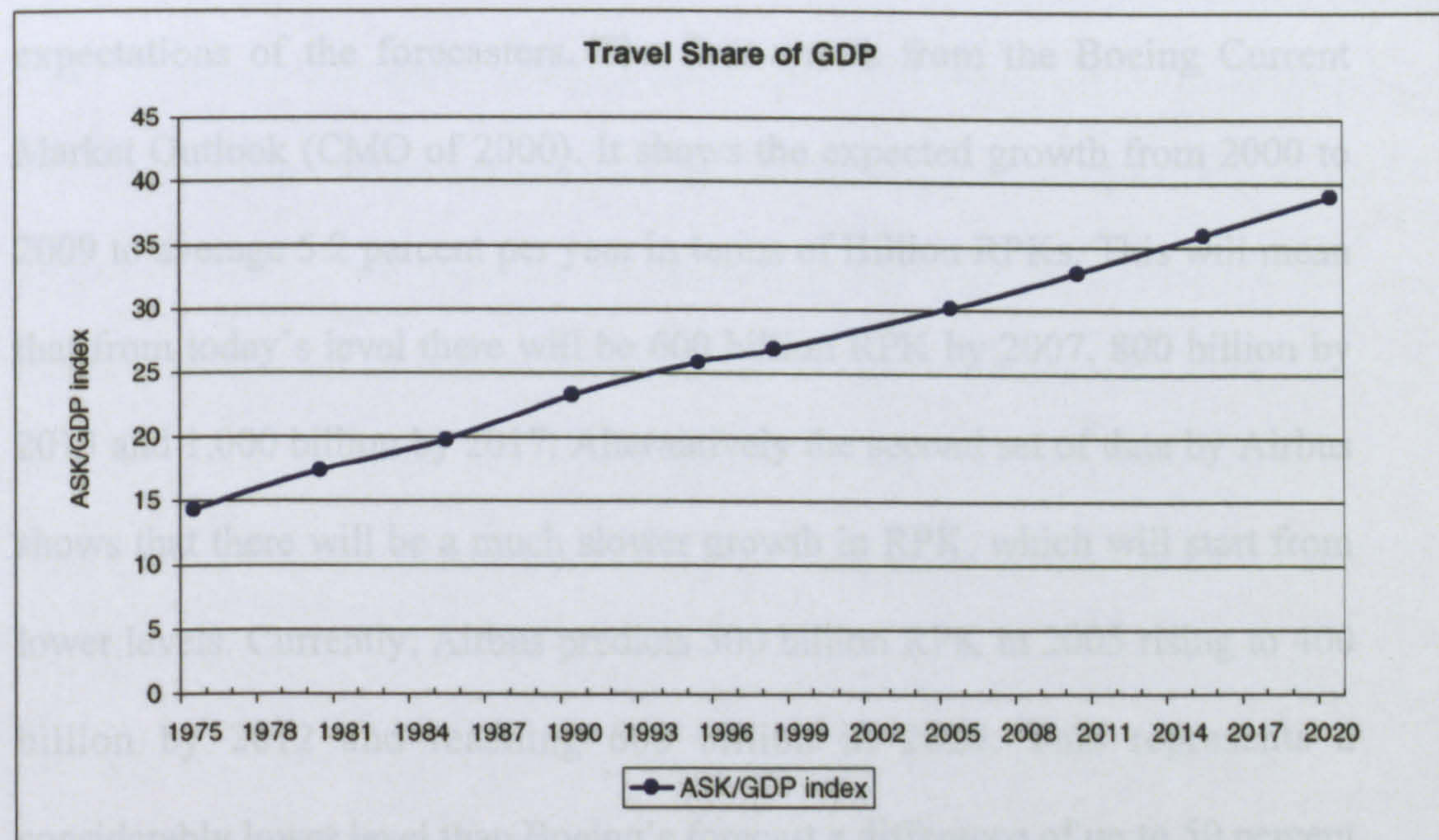
Fig.5.1: World annual traffic trends in RPKs 1967-2017

Historically, this compares with 11.6 percent for 1967-77, 6.9 percent for 1977-87 and 4.5 percent for 1987-97. On average since 1967 world traffic growth has averaged out 8 percent per annum in terms of Revenue Passenger Kilometres performed. Driven mainly by continuing economic (GDP) growth and reduced fares, passenger traffic (revenue passenger-kilometres) will grow at an average annual rate of 5.2 percent during the next ten years.



Source: Boeing, CMO 2000

Fig.5.2: Annual RPK Growth by Region.



Source: Boeing, CMO 2000

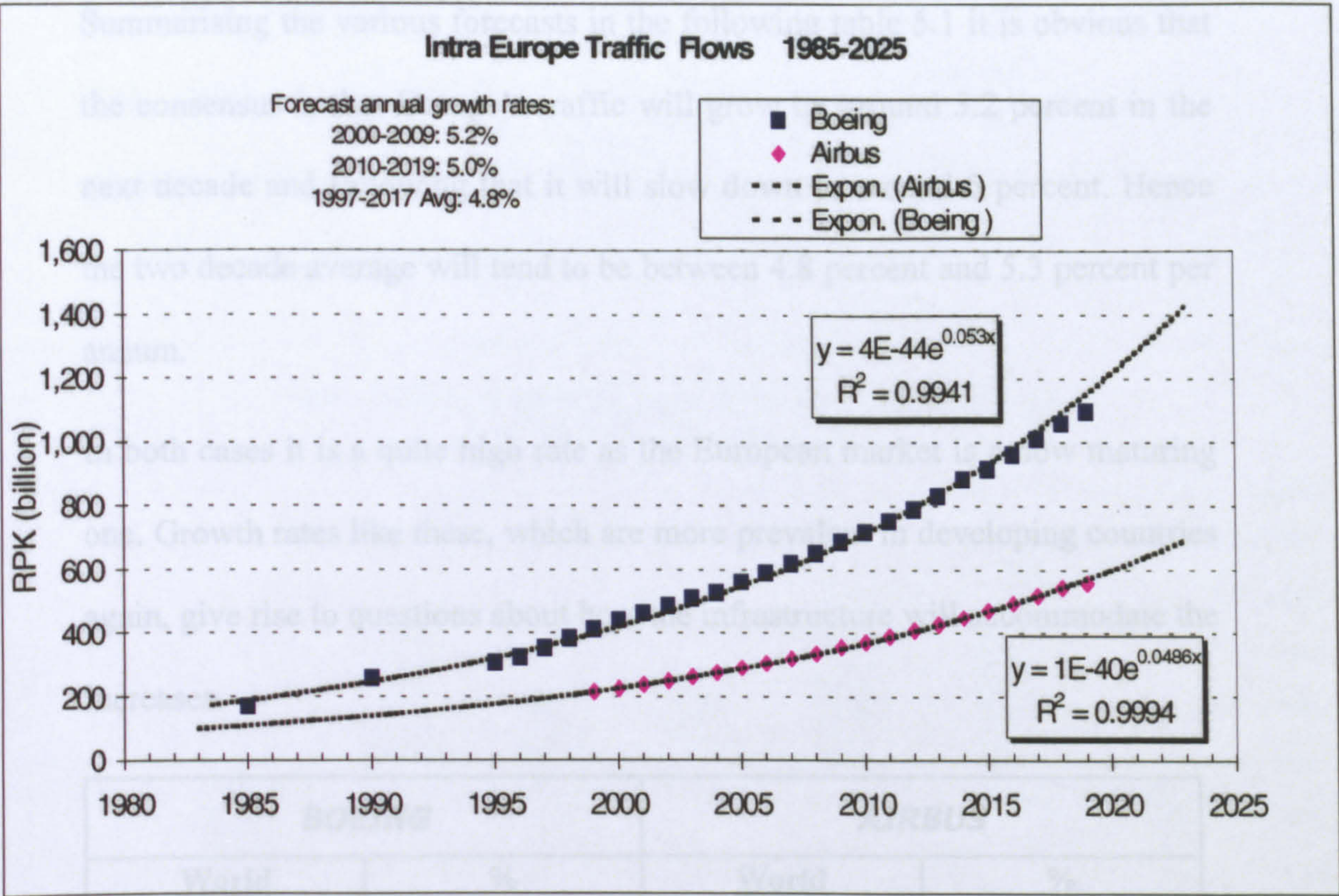
Fig.5.3: Travel share of GDP

5.1.1.2 European Forecasts

Economic growth in Europe is a blend of smaller developing economies and larger mature economies. Growth is tempered by slow population growth and limited productivity gains in the mature economies. However, a united Europe could lead to more fluid labour markets and increased trade. In 1999 the 1.7 percent increase in passenger-kilometres on intra-European routes translated into a growth in passenger numbers of 4.5 percent

Overall, the 20-year forecast for annual GDP growth is 2.4 percent. Air travel on the region's carriers is forecast to grow at 4.5 percent, substantially faster than GDP. Fast growth is driven by continued liberalisation of markets.

There are two reliable sets of data to show the expected growth in European air travel, which is shown in Fig.5.4 below. They show differences in the expectations of the forecasters. The first one is from the Boeing Current Market Outlook (CMO of 2000). It shows the expected growth from 2000 to 2009 to average 5.2 percent per year in terms of Billion RPKs. This will mean that from today's level there will be 600 billion RPK by 2007, 800 billion by 2013 and 1,000 billion by 2017. Alternatively the second set of data by Airbus shows that there will be a much slower growth in RPK, which will start from lower levels. Currently, Airbus predicts 300 billion RPK in 2005 rising to 400 billion by 2012 and reaching 600 billion in 2020. This represents a considerably lower level than Boeing's forecast a difference of up to 50 percent in 2012-13, which is maintained to 2020.



Source: Boeing, Airbus, 2001

Fig.5.4 Intra European traffic forecast

From the above, a disparity is noted between the starting positions of the two sets of data. This can be attributed to the fact that the start for the calculation was back in 1985 and therefore the projections are ongoing. Hence with the passage of time small initial differences in the growth rates for subsequent decades, if not corrected, can lead to large deviations after 40 years. Both of these forecasts should be assessed against the projections as to how the airport and airways infrastructure will be able to accommodate such large increases. This will be dealt at a more specific manner in one of the following sections.

Another question that arises from the forecasts is how much of this traffic will be attributable to the already established carriers, how much will be captured by the low cost carriers and to what extent the predicted rates will materialise.

Summarising the various forecasts in the following table 5.1 it is obvious that the consensus is that Europe’s traffic will grow by around 5.2 percent in the next decade and following that it will slow down to around 5 percent. Hence the two decade average will tend to be between 4.8 percent and 5.3 percent per annum.

In both cases it is a quite high rate as the European market is a now maturing one. Growth rates like these, which are more prevalent in developing countries again, give rise to questions about how the infrastructure will accommodate the increases.

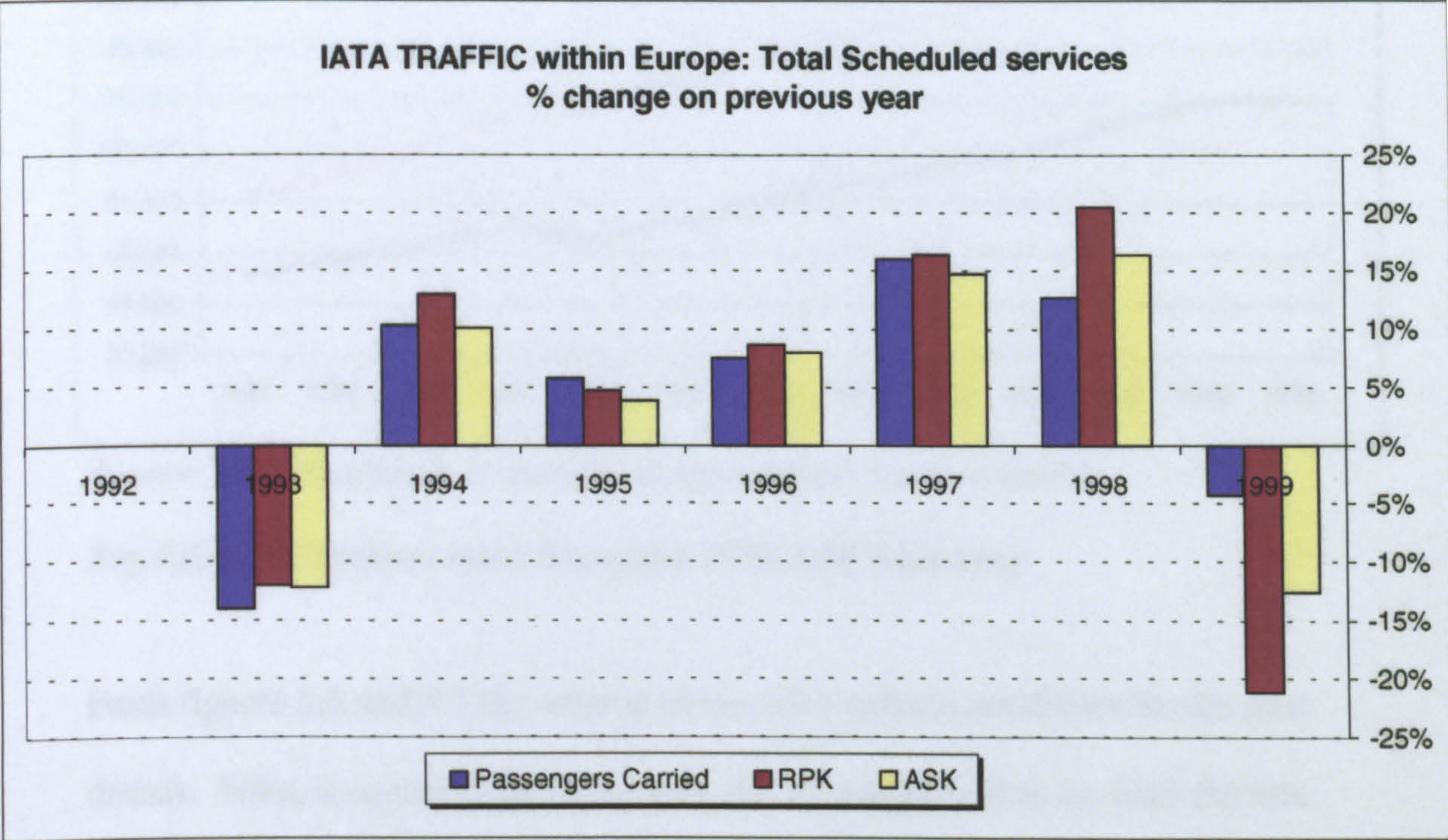
BOEING		AIRBUS	
<u>World</u>	%	<u>World</u>	%
2000-2009	4.7	1999-2009	5.2
2000-2019	4.8	2009-2019	4.6
1997-2017	4.8	1999-2019	4.9
<u>Europe</u>	%	<u>Europe</u>	%
2000-2009	5.2	1999-2009	5.5
2000-2019	5.0	2009-2019	5.0
1997-2017	4.8	1999-2019	5.3

Source: Boeing and Airbus forecasts, 2000

Table 5.1 Annual Traffic Growth Rate in RPKs Summary

Further evidence about the state of traffic is obtained from the IATA using the World Air Transport Statistics Series for the appropriate years. For simplicity a graph of the growth rates of IATA airlines observed is shown in Fig.5.5.

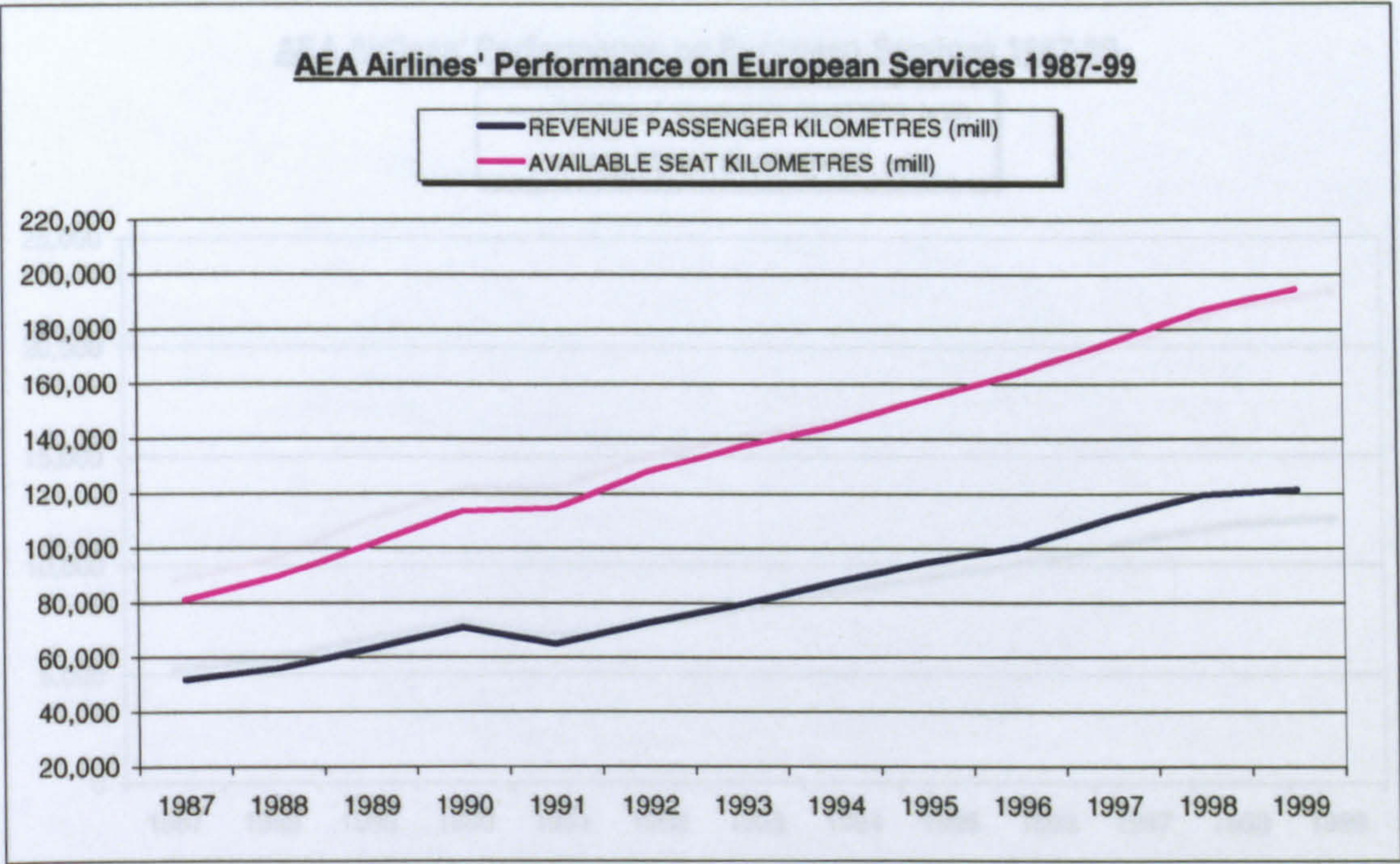
Apart from 1993 which was still lagging behind the early 1990s recession, there were positive years until 1999 which saw a 4.5 percent drop in passengers, but over 20 percent drop in Revenue Passenger Kilometers, despite the airlines reducing their capacities by over 10 percent.



Source: IATA Traffic Reports (various years)

Fig.5.5: IATA Traffic changes in Europe 1992-99

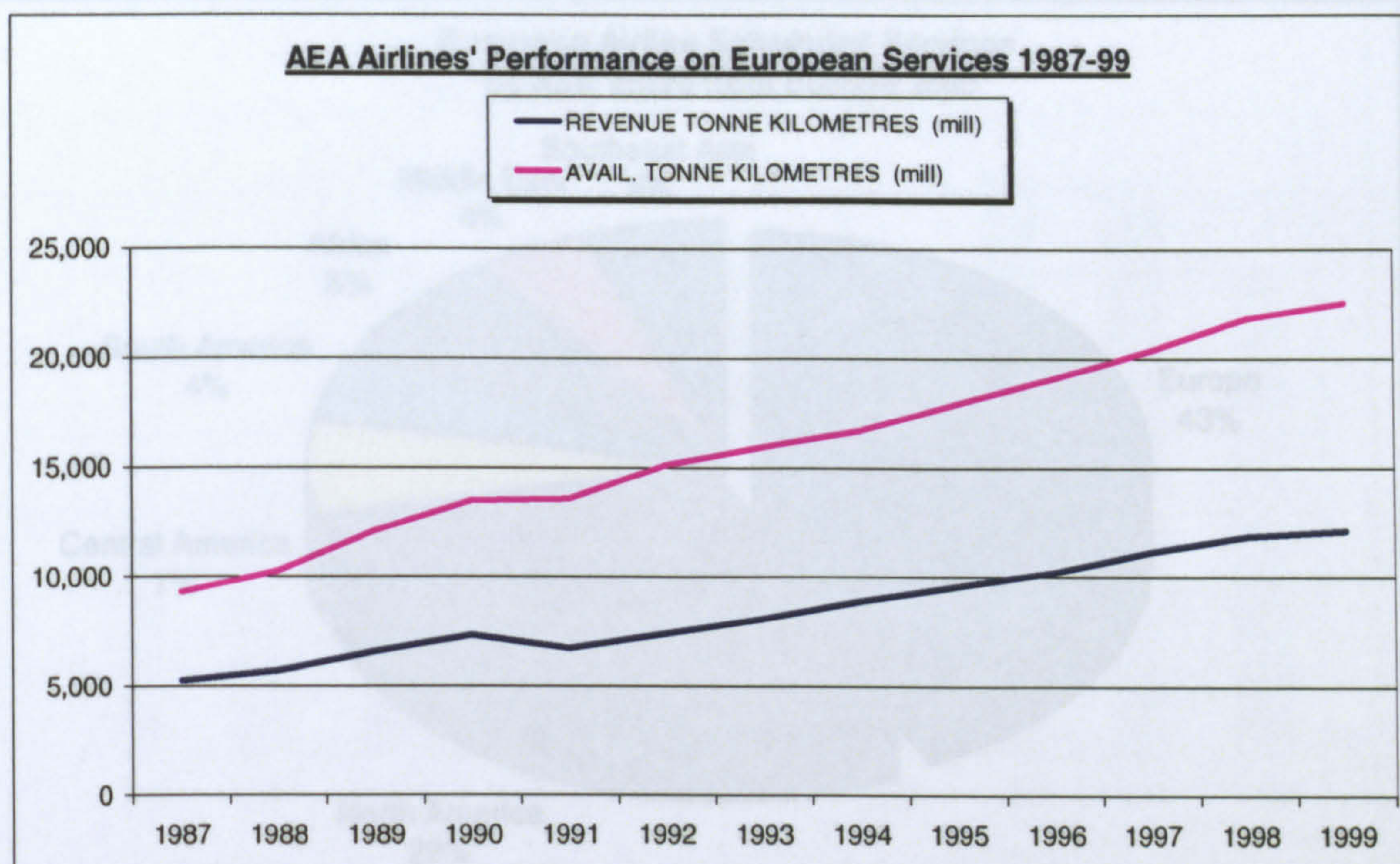
But before we proceed to the closer examination of the low cost carriers we should check the performance of the established carriers of the EU. In order to do this data has been gathered on the airlines belonging to the Association of European Airlines (AEA). This association is comprised of all the established European flag carriers as well as a number of the largest independent carriers in Europe. Their membership in 2000 comprised of 27 carriers almost covering an area within Europe including all of Turkey, the USSR (up to 55°E), Iceland, the Azores, the Canaries, Madeira, and Cyprus. If low cost carriers are to compete within Europe, then these carriers are going to be their main competitors.



Source: AEA Yearbook & Statistical Appendices (various years)

Fig.5.6: AEA Airlines intra European RPK/ASK Summary

From figures 5.6 and 5.7 the outputs of the AEA airlines are shown for the past decade. What is apparent from the two sets of graphs is that up until the late 1980s they were growing at a faster pace than in the 1990s. It is interesting that after the temporary slump in 1990-91 due to the effects of the Gulf War and the sharp rise in oil prices, growth did not recover to the same rate as that before the recession. Furthermore it is also obvious that there has been a continuous divergence between the ATK and RPK lines as well as between the ASK and RPK.

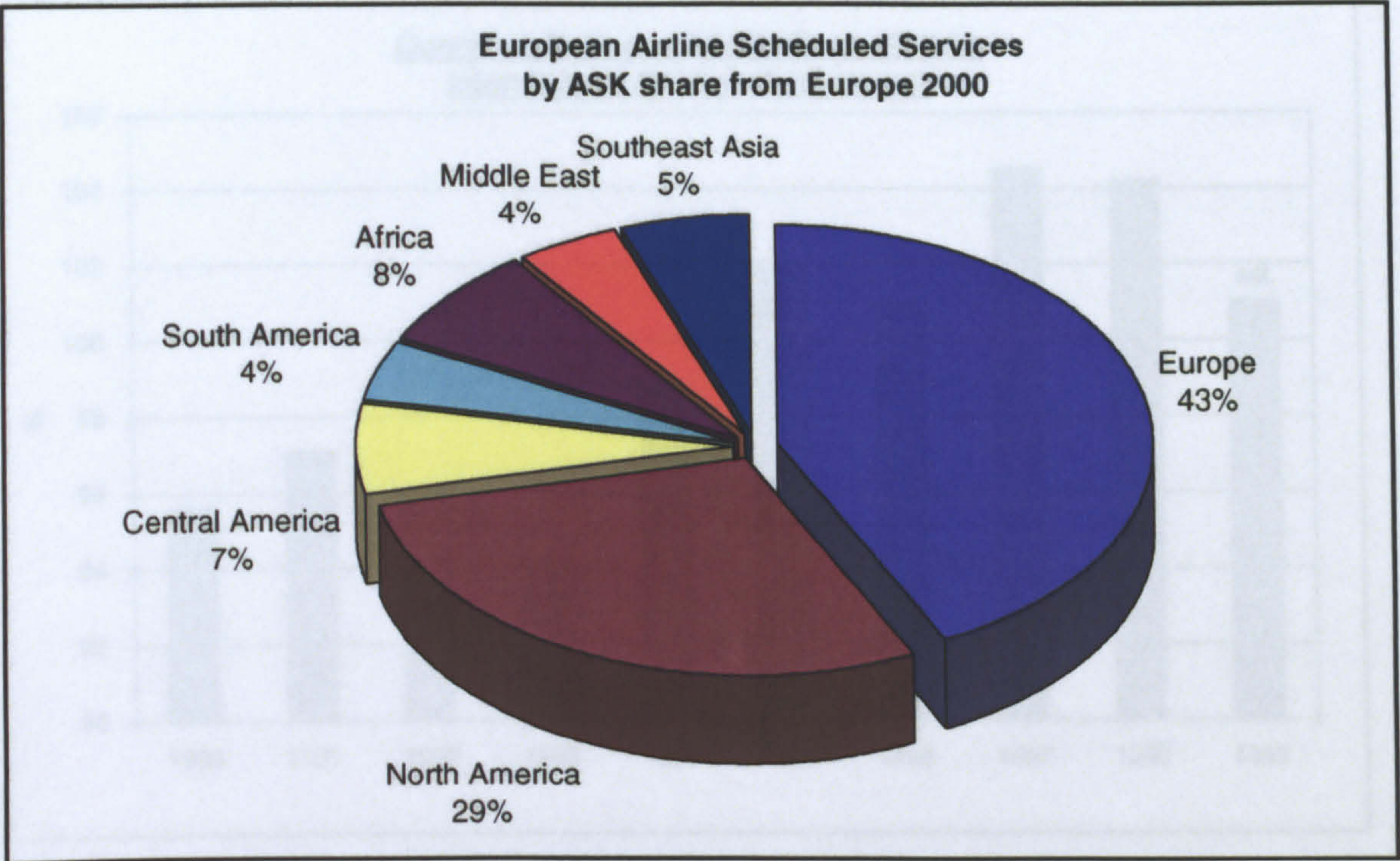


Source: AEA Yearbook & Statistical Appendices (various years)

Fig.5.7: AEA Airlines intra European RTK/ATK Summary

This can also be verified by looking at the seat load factor historical data which show a sharp drop from a high of 73 percent in 1989 to a low of around 58 percent in 1991 and 1992. Load factor then rose slightly but then quickly reached a plateau of 61 percent between 1995 and 1996. Thereafter it climbed to another plateau of 64 percent in 1997 and 1998 and has fallen in 1999.

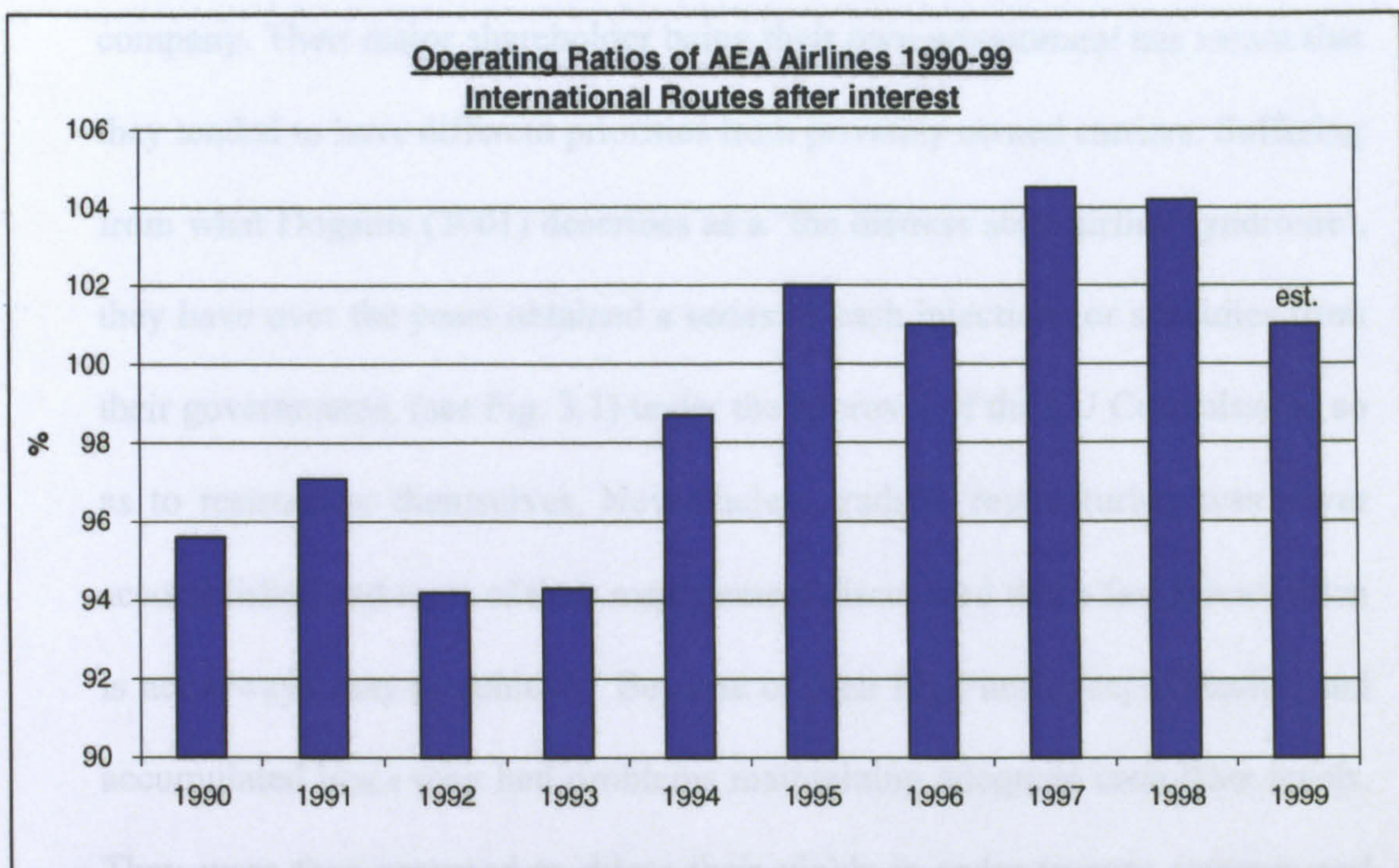
Although from Fig 5.8 it can be seen that the AEA carriers seem to be dominant in the European market, it will be important to examine in the following sections whether there is space for any of the low cost carriers to establish themselves and to expand their operations. The areas requiring examination will be airport infrastructure, airspace capacity, suitable route availability and the possible existence of niche markets where an initial operation can be established.



Source: AEA Yearbook 2000

Fig. 5.8: AEA Airlines share of European Traffic

A similar story of the unprofitability of the airlines is told by their Operating Ratios of Fig 5.9 calculated on their international routes, showing that collectively they took a long time to get back into profitability after the recession of the early 1990s. Apart from the good two years in 1997-98 the rest have seen marginal performances.



Source: AEA Yearbooks (various years)

Fig.5.9: Operating Ratios of AEA airlines 1990-99

On a general note Europe seems to be offering marginal profits for Europe's main airlines. The question that arises from all this is naturally whether the carriers can improve their profitability. In respect of this, it is either a matter of being able to capture a greater market share, or to improve their yields on a wider scale than at the moment. Capturing a greater share of the existing or even growing market will mean a reduction in fares, which in turn will dilute their yield even more. None of the European carriers seem to have been able to refine their yield management systems to the extent that the more successful U.S. carriers have, although some of the more successful ones are getting closer. Other barriers to improvements in profitability seem to be market structure related. Europe is still home to 20 airlines that are at least 50 percent government owned. State owned airlines; particularly those of southern Europe have never operated along the same philosophy as that of a public limited

company. Their major shareholder being their own government has meant that they tended to have different priorities from privately owned carriers. Suffering from what Doganis (2001) describes as a 'the distress state airline syndrome', they have over the years obtained a series of cash injections or subsidies from their governments, (see Fig. 3.1) under the approval of the EU Commission, so as to restructure themselves. Nevertheless, radical restructuring was never accomplished and most of their management discovered that a fast privatisation is not always easy to achieve. Because of their high under-capitalisation and accumulated losses they had problems maintaining adequate cash flow levels. They were thus prepared to dilute their yields in order to earn revenue and market share on routes they served. The overall effect was to depress prices, across the European market, particularly in the more price sensitive leisure passenger fare classes. High yield business traffic will always form a substantial share of operations, but will always prefer airlines with the best punctual service, frequent flyer programme and large connected network.

An analogy could be made that the state owned 'distress state airline syndrome' airlines were the mirror image of the U.S. airlines operating under Chapter 11 bankruptcy protection. They certainly shared several financial characteristics like large long-term debts, under-capitalisation, inadequate cash flow, and inability to operate as a company seeking to maximise its shareholder's wealth.

Herein lies one of the root causes of European majors maintaining services to partly profitable European destinations. Since the beginning of European liberalisation in striving to increase international traffic, most of the bigger

European airlines have become members of commercial or strategic global alliances such as Star Alliance, oneworld, KLM/Northwest and the Qualiflyer Group. The aim of the alliances is to provide seamless service between any two points in the combined network. Therefore routes between the majors' home airport and other European destinations are needed in order to carry connecting passengers from long haul services. Historically international and intercontinental traffic has been higher yield than intra European traffic, but at a more strategic level the latter is almost 'a necessary evil'. As the alliances have attracted more and more members, competition has shifted away from the regional level to the global level. So, for example any intra-European city pair between a point and an alliance member home hub could be competing with another intra-European city pair that belongs to a competing alliance network. In turn, this means that home airports of the bigger European airline partners are likely to become more of a connecting hub, feeding traffic between the European hinterland and the long haul traffic destinations. The PriceWaterhouseCooper Report for the AEA (1998) shows that :

'...alliances enable airlines to strengthen their network operations and compete more effectively at the network level, based on co-operation between partners operating in complementary markets. Alliances therefore are a substitute for organic growth, enabling airlines to extend the reach of their networks'.

Fears about the anti-competitive potential of certain alliances prompted investigations by the EU Commission¹⁷. Since, airlines have for some time

¹⁷ The European Commission launched its investigations of the four main alliances in August 1996. British Airways (BA) and American Airlines (AA), announced in 1996, between Lufthansa, SAS

being focusing on the international markets outside European borders they have sought to increase their competitive advantage through alliance partnerships. If global alliances become more widespread and are truly strategic, then, rivalry between network airlines is sometimes the only possibility for policy makers.

The reduction in average cost per passenger that can be obtained when a carrier manages to transfer a considerable volume of its passengers through a connecting hub means that either competition between carriers on a network level should be encouraged or a reduction in possible O-D city pair routes should be accepted. The economies of scale that accrue from networks can sometimes mean that even if there is an alternative point to point carrier with direct service, the fare will be substantially higher than that for a connecting service through a hub. Alternatively, in the absence of interconnecting passenger traffic, there would not be enough point-to-point traffic to support many lower volume transatlantic routes. In practice, these routes can only be operated by carriers as part of more substantial networks, which generate sufficient feeder traffic to make the routes viable.

5.2 CAPACITY PROVISION ANALYSIS

European airlines, particularly the flag carriers, due to their historical background have always been less dominant in their main airports. Unlike their American counterparts who in the pre-deregulation days identified strongly

and United Airlines, as part of the Star Alliance, launched in 1997, the inclusion of *British Midland*, in the Star alliance. The Commission announced its proposed conditions for approving the BA/AA and Lufthansa/SAS/United alliances in *Official Journal*, C239/5, 30 July 1998.

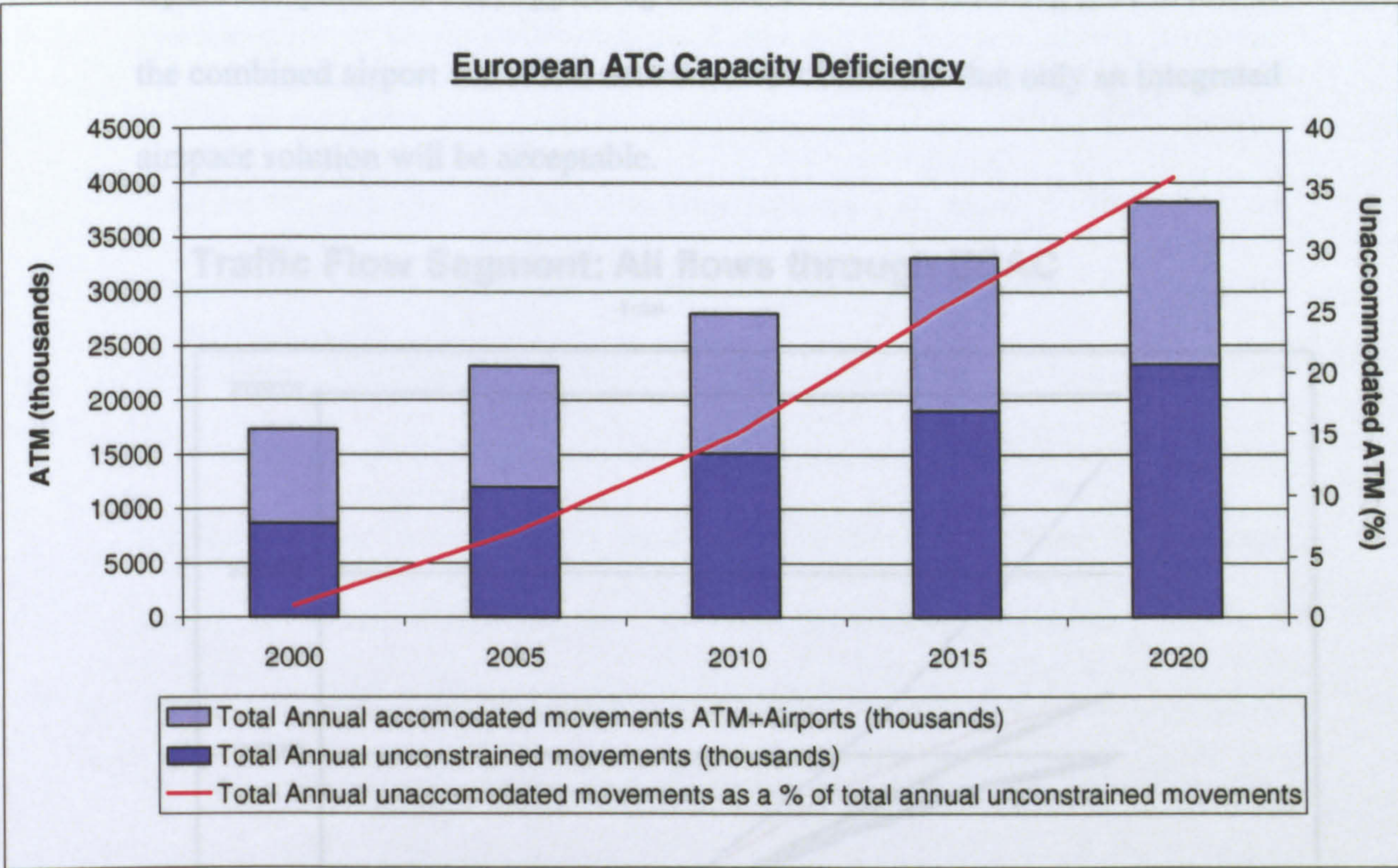
with particular geographical regions of the country (due to the old mail contract routes), European airlines were never in such a strong monopolistic position at the home airport. The main difference has been that only a few of the East Coast and West Coast airports in the U.S. were actual international gateways (i.e. JFK, Newark, LAX, SFO) where non-U.S. airlines were landing with international traffic rights. All the others only accepted domestic traffic. United Airways, the world's biggest airline (outside the USSR), was a purely domestic carrier until the sale of Pan Am's Pacific Division. On the other hand, due to the regulatory regime that prevailed since the war, the exchange of bilateral rights in Europe, created airports with a combination of domestic and international routes served by many foreign airlines with a few services a day in the best case. The home carriers in turn had to spread their capacity across their entire destination network, which included domestic, intra-European and intercontinental services, bilaterally accepting reciprocal flights from these destinations. Therefore the home carrier's share was diluted.

5.2.1 Airspace Capacity

This, being the quantity of aircraft able to be accommodated in space and time, varies greatly across the EU countries as well as across the different types of airspace available. Currently the European air traffic system is so fragmented that it consists of: 49 European control centres, 31 national systems, 18 suppliers of system hardware, 22 computer operating systems and 30 programming languages [AEA (2000)].

At the airport level where the capacity shortfalls are measured, year after year delays are becoming the norm. During the last year there were 8 EU airports with percentages of flights departing later than 15 minutes were between 30 percent and 36.6 percent. Thirteen of the airports on the AEA list had a delay rate (intra-European departures delayed more than 15 minutes) worse than the overall average for the year of 25.5 percent. That was actually an improvement on the previous year! Figure 5.10 in the next page indicates clearly the scale of the problems stored up for the future.

The problem of airspace capacity naturally is pan European and as a result requires a pan European solution. The rationalisation needed will mean that in the short term greater Industry stakeholders particularly supported the idea of a more collaborative approach in seeking ways to accommodate demand in a sustainable way.



Source: ECAC – Eurocontrol 2000

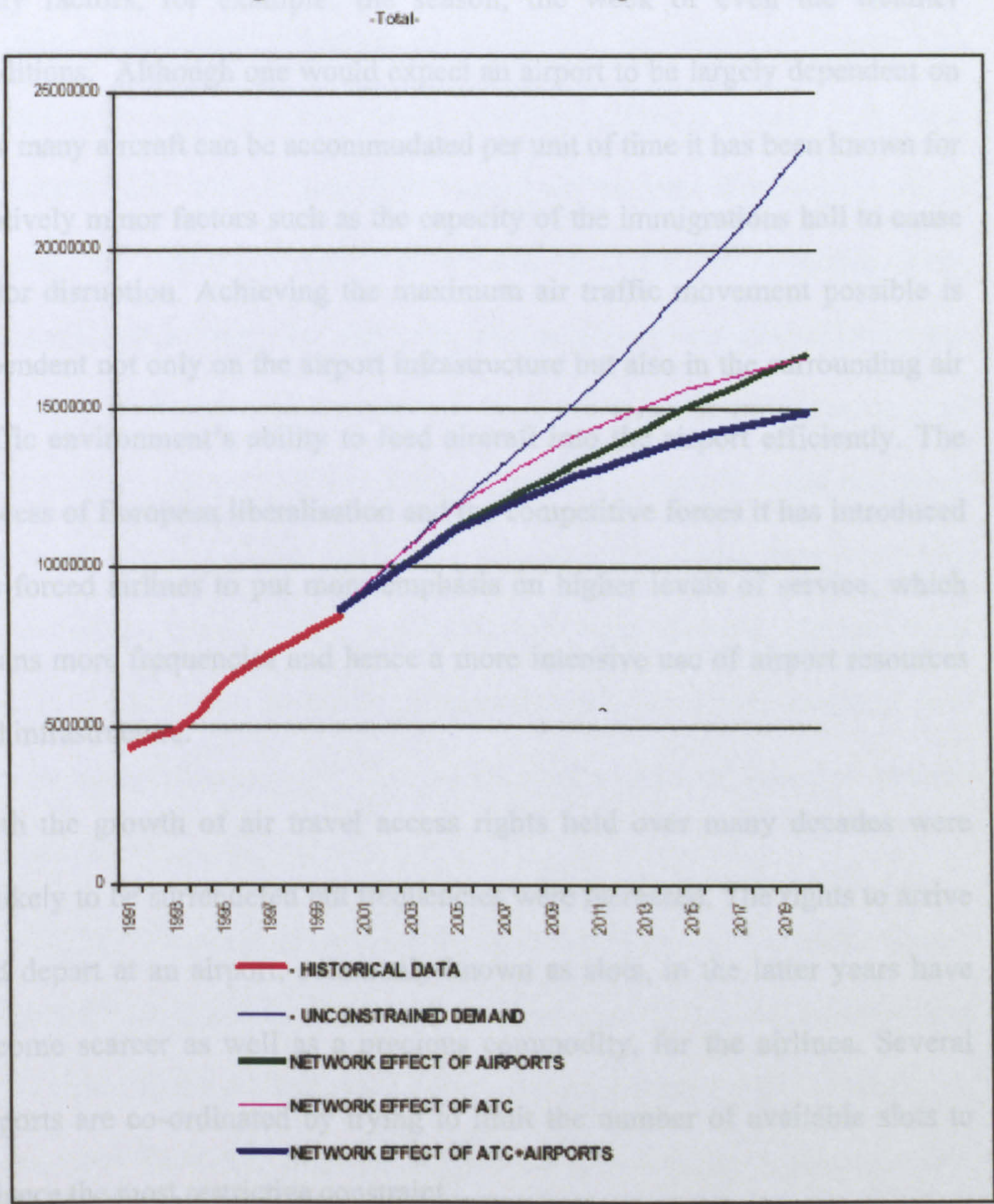
Fig. 5.10 European ATC capacity Deficiencies

The present level of co-operation might not be sufficient to enable future challenges to be met successfully. In the longer term a more strategic approach is needed whereby specific national issues are not put up as barriers to further development. In view of the continuing impasse on airspace reform during the last few years, Eurocontrol has become much more interventionist on demanding deadlines for the implementation of new standards and technical specifications.

The graph in fig 5.11 was part of a study by ECAC-Eurocontrol (2000) aimed to ‘...provide a broad “what-if” picture of when and where in the ECAC area, growth may become seriously constrained by capacity limits in ATM and at

airports.’ It shows clearly the shortfall between demand and capacity and that significant problems start appearing around 2005. The declining growth rate of the combined airport and ATM network effect indicates that only an integrated airspace solution will be acceptable.

Traffic Flow Segment: All flows through ECAC



Source: ECAC – Eurocontrol 2000

Fig. 5.11 European ATC flow problems

5.2.2 Airport Capacity

The capacity of an airport is expressed and can be limited by two parts: air traffic movements and terminal passenger numbers. The critical factors limiting the airports' capacity can vary from one to another, depending on many factors, for example: the season, the week or even the weather conditions. Although one would expect an airport to be largely dependent on how many aircraft can be accommodated per unit of time it has been known for relatively minor factors such as the capacity of the immigrations hall to cause major disruption. Achieving the maximum air traffic movement possible is dependent not only on the airport infrastructure but also in the surrounding air traffic environment's ability to feed aircraft into the airport efficiently. The process of European liberalisation and the competitive forces it has introduced has forced airlines to put more emphasis on higher levels of service, which means more frequencies and hence a more intensive use of airport resources and infrastructure.

With the growth of air travel access rights held over many decades were unlikely to be surrendered but frequencies were increased. The rights to arrive and depart at an airport, commonly known as slots, in the latter years have become scarcer as well as a precious commodity, for the airlines. Several airports are co-ordinated by trying to limit the number of available slots to balance the most restrictive constraint.

5.2.2.1 *United States*

In the U.S. market the same problem of chronic congestion at a variety of regional hubs has been encountered. Administrative measures have been

adopted, such as hourly quotas limiting airline use of high-demand airports. However, these administrative remedies have had the unintended effect of presenting other obstacles to airline entry and competition. The air traffic control system—administered by the Federal Aviation Administration (FAA)—being under public ownership cannot respond to marketplace demands. Without this freedom, constraints on the supply of airports and navigable air space have increased, and their adverse effects have been magnified. TRB - NRC Report (1999) supported the view of pricing the use of airways and airports as the most suitable approach for achieving these outcomes, and probably the only long-term solution to ensuring efficient use and supply of this vital infrastructure. Setting fees that reflect the true marginal cost of using congested airports during high-demand periods would encourage those peak users who place the lowest value on flying during these periods to either shift to off-peak times or to nearby secondary airports. The traditional landing fee has been based on an aircraft's weight, which mainly affects runway wear, but has not reflected the use of congested infrastructure at high-demand periods.

A further development has been the application of 'Airport Perimeter Rules'. These are Federal and local rules that limit long-haul flights to and from three major U.S. airports—Washington Reagan National, New York LaGuardia, and Dallas Love Field. The rules no longer serve their original purpose and have produced too many adverse and anti competitive side effects.

Originally, the FAA imposed slot controls in the 1981 air traffic controllers strike at National, LaGuardia, JFK, O'Hare and 18 other congested airports. During this period, FAA allowed airlines to trade, buy, and sell slots in order to

maintain networks and ensure efficient use. Slots at the 18 airports were removed in 1984, but bolstered by this experience, the FAA allowed slot sales at the four original and continuing slot-controlled airports, beginning in 1985. In adopting the “buy/sell” rule, FAA explicitly acknowledged that scarce slots had become valuable assets to airlines. Although the slots remained under federal ownership they have never been recalled. One of the reasons for the high demand for slots is the economic value of the higher price-inelastic, business traffic that is made possible by having these key airports in their networks. At the initial sale the FAA allowed the ‘grandfather’ use of the slots to airlines that held them at the time of the rulemaking, only withholding a small number to reallocate among new entrants. Despite included “use or lose” provisions and antitrust enforcement it did not stop airlines using slots as a defensive mechanism. The effects of slot controls on airlines have avoided the shifting of an increased share of slots to larger commercial aircraft, which carry the majority of air travellers. It has encouraged the hoarding of these assets, on a hub as well as on a regional level, by incumbents to restrict entry and expansion by rivals, preventing development of large hub and spoke network, at popular airports for business travellers, who are the type of passengers willing to pay the higher fares to use convenient airports. This is also reflected in the high prices paid by airlines for jet slots—often exceeding \$1 million at popular hubs. Concentration of slots among a few major carriers simply might reflect more efficient usage but there will be reduced scope for new hub creation and new entry at any slot constrained airport because any new entrant would wish to quickly establish a sizeable scale of operation, made impossible by slot limitations. Also, the nature of pricing of the slots actually make them

more valuable to their owners in order to stop an unwanted competitor entering than to the new entrant in order to open a new destination.

5.2.2.2 *European Union*

In Europe as a result of a different historical background and recent legislation¹⁸ in most European airports slot allocation is carried out by an airport committee which ‘...as the competent authority determines the capacity available for slot allocation twice yearly in co-operation with representatives of air traffic control, customs and immigration authorities and air carriers using the airport and/or their representative organisations and the airport co-ordinator, according to commonly recognised methods.’

Slots may be freely exchanged between air carriers or transferred by an air carrier from one route, or type of service, to another, by mutual agreement or as a result of a total or partial take-over or unilaterally. Any such exchanges or transfers should be transparent. However, analysts have for a long time suspected that slot trading or ‘slot bartering’ has been taking place, indirectly under ‘silent agreements’ between airlines at particular congested airports.

Similarly to the U.S. system there are clauses whereby, a pool shall be set up for each co-ordinated period containing new and unused slots, together with slots which have been given up by a carrier to be reallocated. 50 percent of them are offered to new entrants and new services and the rest to other applicants.

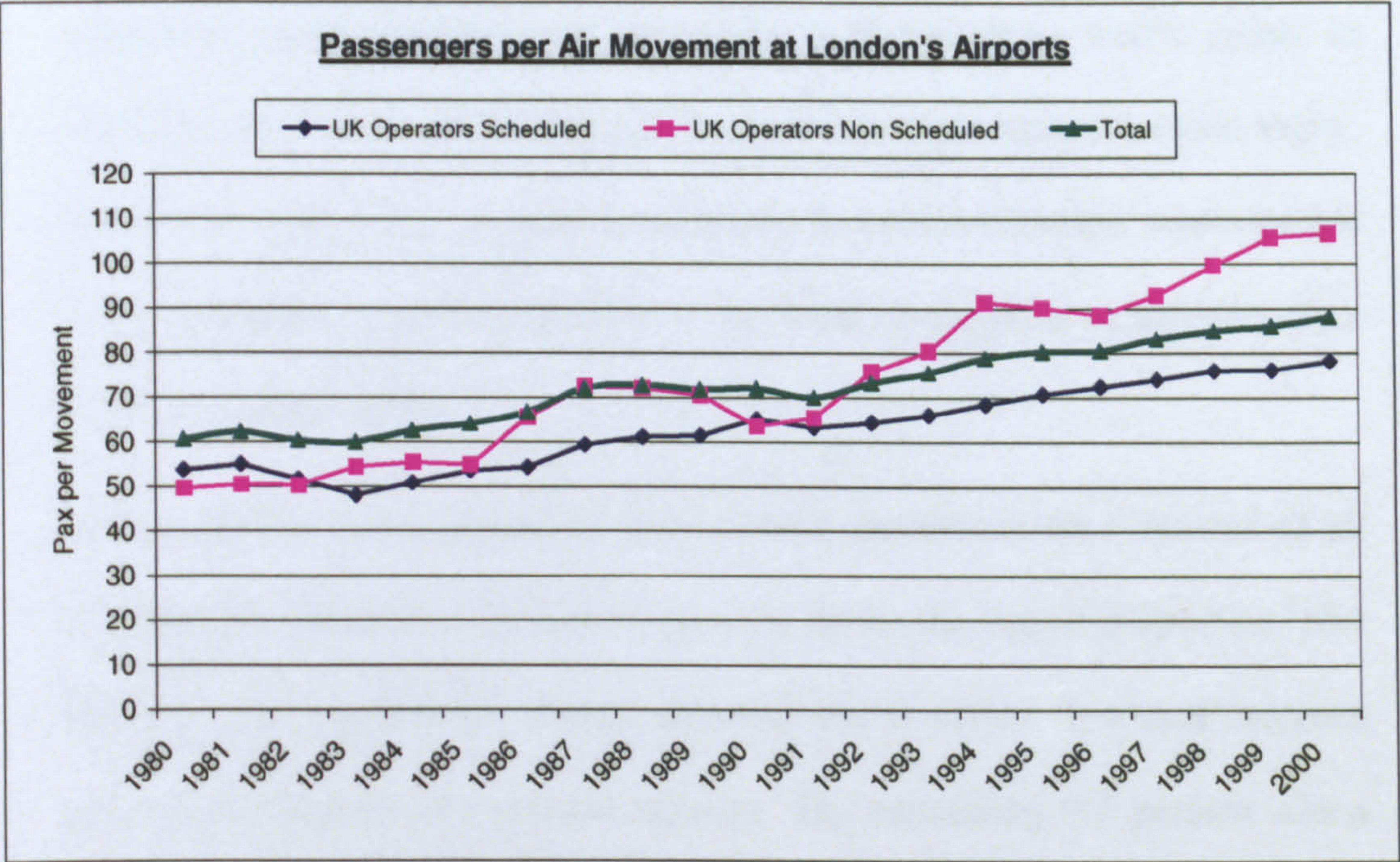
¹⁸ *Council Regulation (EEC) No 95/93 of 18 January 1993 on common rules for the allocation of slots at Community airports and Official Journal L 014, 22/01/1993 pp. 1 - 6*

Additionally a 'use-it-or-lose-it' philosophy is applied with a usage threshold of 80% as in the U.S. In many cases the role of the co-ordinator of slot allocation is taken up by either the regulatory authority of the country concerned, usually a government agency or by the airport authority, which might also be state owned. In the many cases where the national carrier is also state owned then a conflict of interest may arise as to the implementation of the EUC policy. By the end of 2000, 23 European airports will have been designated as fully co-ordinated according to Council Regulation (EEC) No 95/93 investigated by the EUC report (2000).

The European regulatory authorities have resisted any attempts to allow any major changes by introducing market practices in the form of even limited slot trading. They do not consider the marketplace as an efficient way to allocate scarce resources. Consequently, from a variety of data it appears that the airlines are doing exactly what their U.S. counterparts did after deregulation. They have recognised from an early stage that slots are valuable assets, which will increase in value with time. As the congestion becomes worse and because of the political costs involved in the building of more runway capacity, airport slots are increasingly becoming rare. New slots are not likely to materialise in quantity so, the airlines have to use their existing portfolios of slots to introduce new and extra services. Slots used on secondary airports or by franchisee operators can be transferred to the main carrier when necessary.

CAA (2000a) data shows that at London's main airports UK scheduled operators are spreading their services so as to capture as much airport capacity as is possible. The evidence is shown by the very gradual rate of increase of the ratio of passengers per aircraft movement. The implication of this is that

mainline carriers are not increasing the average aircraft size and instead prefer to increase frequencies at a congested airport so as to maintain a higher slot share as possible to themselves.



Source: CAA Airport and Airline data (various years)

Fig.5.12: Aircraft and passenger usage at London’s Airports

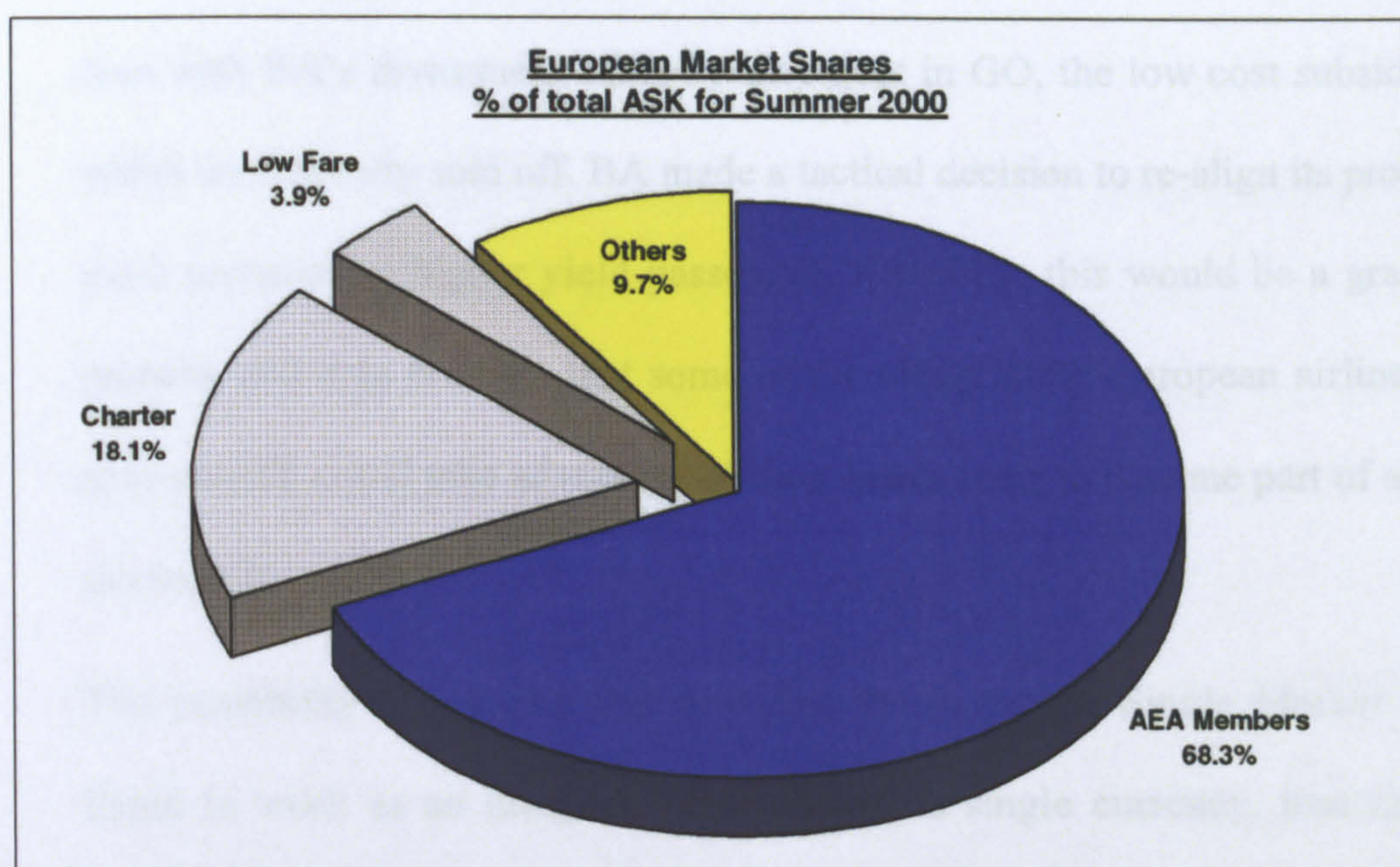
Conversely, the charter operators are actually shown to have increased the passenger density in their aircraft movements, despite being historically operators of high density aircraft and high load factor services. It seems that the charter airlines are making more efficient use of scarce slot resources, despite the fact that a large volume of slots is required during the summer-time package holiday season, which is historically a very busy period for airports.

Some infrastructure upgrade is under way and is being planned for the future. Between 1998 and 2010, 4 new airports have been planned in Oslo (1998), Athens (2001), Berlin (2007) and Lisbon (2008). Also, during the same period there are plans for 15 new runways to be built around Europe [ECAC (1998)].

5.3 MARKET ANALYSIS

New carriers are adding new routes, developing low fare structures in many parts of Europe. Larger carriers are developing hubs with waves of regional departures. Both schedule and price effects should drive traffic gains. In addition, parts of Europe do not travel as much as their incomes would imply. Some of this behaviour is cultural, especially in southern Europe, where people tend to vacation with their families in the local countryside or drive to other locations within Europe.

In the summer 1999 timetable, AEA airlines performed 68.3 percent of all cross-border seat-km in Europe. Of the rest, by far the largest proportion, 18.1 percent, was operated by charter airlines; the so-called 'low-fare' carriers offered 3.9 percent of the total capacity. The remaining 9.7 percent was a mixture of non-AEA national and other mainline carriers, and regional airlines.



Source: AEA Yearbook 2000

Fig.5.13: Shares of European market by airline type

Combining scheduled and non-scheduled service, European airlines fly over half of their traffic within Europe and to short-haul markets in the Middle East and North Africa. Increasingly, the leisure airlines of Europe are listing their flights as scheduled. Low-cost carriers also increasingly fly within Europe with smaller jets, mainly by the Boeing 737. The expected increase in low cost carriers using smaller 737-300/400 sized aircraft, independent of the mainline carriers will avoid the restrictive scope clauses of the U.S. affiliated regional airlines, which limit the wider use of regional jets.

As connecting hubs are generally much less developed than in the United States due to population distribution, slot limitations will result in more hub bypass and point-to-point services. It is possible that due to the market fragmentation the established airlines could gradually re-align their marketing towards international oriented routes and allow space for the routes that low

cost carriers would be more suitable to operate. Some signs have already been seen with BA's divestment of its involvement in GO, the low cost subsidiary which was recently sold off. BA made a tactical decision to re-align its product more towards the higher yield passenger. Naturally, this would be a gradual process, and it is possible that some of the ailing south European airlines, if restructured, could take advantage of their lower costs to become part of a two tier market.

The possibility also exists that provided the European Single Market does begin to work as an integrated market with a single currency, true labour mobility, free access to information and devoid of localised protective national laws then in due course intra-European to long haul traffic could be carried by 3 to 4 large carriers, or carrier groupings. This tier would include most regional carriers who would either become aligned to the main carriers or be wholly owned subsidiaries. Their role would be to provide feed traffic to the main airline hub airports and could also be used as a marketing tool to open up low density routes with low risk for their parent company. It should not be expected for the main carriers to follow the example set by the U.S. counterparts in trying to combat the spread of low cost operators by starting up their own in-house low cost subsidiaries. This will only cause problems for their overall structure.

This role should be left for the lower tier airlines from which could evolve a low cost market sector which would carry leisure and V.F.R. (visiting friends and relatives) traffic to the secondary or smaller regional airports of Europe at lower fares. As Southwest has proven, by providing proper attention to this market segment there is no reason to suggest that the low cost market should

also be a low quality market. The opportunities exist for this segment to grow considerably to similar levels as in the U.S.

Finally, in this scenario the charter companies will mostly maintain their existing mode of operation, possibly by making their product more flexible and with wider variety in order to satisfy the current trend for more self catering accommodation and exotic holiday locations.

6 MODELLING A LOW COST CARRIER

6.1 INTRODUCTION

For the purposes of this research it was necessary to examine the costs involved behind an airline operation. At the time of researching for this thesis, the European liberalisation had already been initiated in the late 1980s and by the end of 1992 the legislation achieving full liberalisation of the scheduled air transport services was complete. However unlike the United States there was a lag between that date and any real developments.

During the first five years, not forgetting that recovery from deep recession was also taking place, there was some restructuring in capacity. In the low cost sector there were a handful airlines like Dan-Air and Air Europe in the UK which used to provide a mix of scheduled and charter services. Both these airlines did not survive the recession and failed in late 1992 and 1991, respectively. In Europe the carriers that provided lower cost travel but were still in the same operating mode as the main carriers were independently owned airlines like TAT, Air Liberté, AOM, AirOne, Spanair, and City Jet of Ireland. There were also two other carriers who rose out of the ashes of ILG's (Air Europe's holding company) original European network, Air Europa in Spain and Air Europe SpA in Italy. After ILG's demise they were taken over by local investors but retained the original name and livery. Both of them are now operating a mix of European or long haul charter and domestic scheduled services. Until October 1995 Europe's airlines had experimented with a variety of small changes in routes, but had decided not to take full advantage of the

opportunities offered to them by full liberalisation. Overall the main benefits of the liberalisation were mostly felt in the local domestic markets where new entrants started challenging the monopoly of the domestic operators.

The main development on an intra-Europe basis which formed the beginning of what is now known as the 'low cost no frill sector' was the emergence of Ryanair in 1991. Ryanair was established in Dublin since 1985 as a competitor to Aer Lingus, serving the Ireland-UK market with a mixed fleet of turboprop and jet aircraft. In 1991 after losing money, it re-invented itself as a low cost-no frills operator, flying an all Boeing 737-200 fleet, imitating the model of Southwest airlines. In October 1995 easyJet and Debonair were established in London Luton airport. From these two only easyJet offered the same type of low cost service as Ryanair. More recently British Airways tried to purchase easyJet but when that failed decided to establish a wholly owned subsidiary, GO airlines at Stansted, which was to operate on the same philosophy as Ryanair and easyJet. This move was seen as a cynical attempt by BA to use its superior financial strength to put the two Luton airlines out of business, or to get slots at Stansted with a view to future expansion. KLM, whose subsidiary KLMuk was also based in Stansted decided in 1999 to merge out of KLMuk a similar airline, renamed 'buzz'.

6.2 METHODOLOGY

In order to find a way to project this type of operation it was necessary to model a typical low cost airline. Low cost airlines are known to operate a single type of aircraft, or in some cases sub types of the same model. Ryanair for example uses an all B737-200 fleet which is now being upgraded to an all

B737-800 fleet. easyJet similarly is using only B737-300/700s, and Go an all B737-300 fleet.

For the purpose of simulation cost data were required from real airlines. Unfortunately this is a commercially sensitive area for which even historical data are very difficult to be obtained prior to publication in IATA / ICAO surveys. Therefore our own model was built up using relationships already known from real airline operations' parameters and other data widely available. It was considered that the most important cost area to focus would be the Direct Operating Costs (DOCs). Any advantage that these new airlines would have over the established carriers would be in this area. So starting with a lower cost base, if they could maintain it, would allow them to offer truly lower fares and remain profitable at the same time.

Using this model it was possible to obtain approximations for the DIRECT OPERATING COST of particular aircraft types based on a nominal stage length. Having obtained that, we then calculated other parameters such as total sector costs, total seat kilometre costs and total direct operating costs per block hour.

These results would then be applied to a number of European city pairs, hence building up a potential network of costed routes on which the airlines could operate if they so wished.

All other things being equal, an airline operation can be simulated with reference to other factors such as schedule information, traffic capacity and available seating capacity. One area where again it was difficult to get a true value for our simulation was the approximation of landing and ground handling

costs. Again it is a known fact that the low cost airlines are very adept at extracting very beneficial rates from the secondary airports they serve. The offer of the possibility of achieving a scheduled jet service with the associated traffic and revenue it brings to the airport and the local economy are a powerful incentive and the airport operators agree to lowering their airport charges. However once the introductory period of the initial contract expires or requires renewal then airport operators are very likely to want to raise their charges to more realistic levels. In this case, part of the cost advantage of the low cost carrier is eroded. It will be interesting to see in the long term whether this trend can be resisted by the carriers.

6.3 DESCRIPTION OF MODEL PARTS AND THEIR FUNCTION.

This simulation is based in 3 parts. First is the main part which aims to provide a way to calculate the Direct Operating Costs of a typical low cost airline. Under the DOC category, a wide range of costs can be included [Jenkinson, Simpkin, Rhodes (1999)]. Usually, standardised DOC methods of calculation can be broadly covered under four main groups.

Standing charges. Charges usually not directly dependent on aircraft flight. Depreciation of the capital investment, interest charges on capital employed, aircraft insurance.

Maintenance costs. Can be expressed as total maintenance cost and include all maintenance on airframes and engines plus the maintenance burden, being the charge to cover the overhead costs of providing maintenance on an hourly basis.

Flight costs. All costs directly relevant to the aircraft flight. Crew costs, fuel and oil consumption, landing and navigational charges.

In these cost categories their constituent parts are possible to be derived from a variety of known aircraft or operating parameters. Therefore here below is a list of the expressions used in our model simulation. The starting point is the selection of an aircraft type and a nominal sector length. Here this was the Boeing 737-300 and a 1,000 mile sector. For establishing the relationships between the various parameters the costing formulae of the Association of European Airlines was also taken into account, but efforts have been made to adapt and simplify it, where necessary, to fit the current low cost carrier characteristics.

6.3.1 Operational Calculations

Parameter	Name	Calculation
Stage length, km	Stag	=sect * 1.852
Block fuel, lb	Blkf	=fucon * 2.205 * blkt
Block time, hr	Blkt	Derived from schedule data (*)
Utilisation, sector/yr	Util	=3750 / (blkt+0.5)
Fuel price, \$/U.S. gal	Fupr	0.85 (World Average for 2000)
Number of seats	Nsea	(As per type , intra-Europe avg.)
Seat Load Factor	SLF	0.75
No. of engines	NE	As per aircraft specifications
C1	C_1	=1.27-0.2 * BPR ^ 0.2
C2	C_2	=0.4 * (OAP/20) ^ 1.3+0.4
C3	C_3	=0.032 * NC + 0.57

The stage length is the sector length in kilometres. Block fuel is expressed as a function of block time and fuel consumption. Fuel consumption figures published in Flight International aircraft surveys have been used.

An expression for block time is derived from aircraft schedules on a variety of routes, using the OAG timetables. A detailed explanation of the derivation of the block analysis data is given in section on Route Survey Description below.

The fuel is calculated using the data for actual fuel consumption in kg/hr from aircraft and airline data surveys available from associated organisations (Flight International, ATA, AEA). This is converted into block fuel by simply multiplying it with the block time.

Fuel price is the world average for 2000, the number of seats are the actual seating configuration in a one class high density seating. Seat load factor is the number of seats actually occupied in flight expressed as a percentage of the full amount of seats in the aircraft. Low cost carriers tend to operate their aircraft with seat load factors at least in the 75 to 85 percent region.

C1, C2 and C3 are engine parameters referring to the mass airflow speed at various points of the engine. BPR is the engine by-pass ratio and OAP is the engine overall pressure ratio, calculated between the entry and exit of the compressor.

Utilisation of aircraft in sectors flown per year is a function of block time and the mode of Operations involved in. For Short Haul operations 3750 hours per year is used compared with 4800 hrs per year for long haul operations.

6.3.2 Technical Characteristics

The Manufacturers Empty Weight has been taken as the operational empty weight. Data referring to aircraft or engine specifications have been checked from the appropriate Jane's All the World's Aircraft and Engines Yearbook. Prices of aircraft and engines have been checked from either Avmark Aviation Economist Jet Values or Airline Business surveys or the Lloyds Aviation Aircraft Types and Price Guidelines. Where a spread of values was given, then

a two third point value is selected. This is done in order to represent both the carriers that use new bought aircraft, as well as those using older second hand equipment.

List Of Technical Characteristics In Model

Parameter	Name	Calculation
Engine weight, kg	WE	As per engine specifications
Engine price \$U.S. Mill	ENP	As per manufacturer price list
By Pass Ratio	BPR	As per engine specifications
S.L. stat. thrust, t	SLS	As per engine specifications
Overall Pressure Ratio	OAP	As per engine specifications
No. compressor stages	NC	As per engine specifications
Max.TOW, t	MTO	As per aircraft specifications
Manuf. Weight Empty, t	MWE	As per engine specifications
A'c price, \$U.S. M	MSP	As per manufacturer specifications
Labour rate, \$/hr	LR	66
Tot. Inves't \$U.S. M	TI	=MSP+0.1*(MSP-NE*ENP)+0.3*NE*ENP
Airframe weight, t	AFW	=MWE-NE*WE/1000

6.3.3 Individual Shares of DOC Calculation

The parameters used for the model calculation are shown overleaf together with the formulae used to calculated them. As data for the parameters were not directly available, approximations had to be used. This was accomplished by using relationships describing the required variables in parametric form.

<u>Parameter</u>	<u>Calculation</u>
Depreciation	$=TI*1000000/20/utl$
Interest	$=50000*TI/utl$
Insurance	$=6000*MSP/utl$
Cockpit crew	$=460*blkt$
Cabin crew	$=60*INT(nsea/35+0.5)*blkt$
Landing fees	$=10.6*MTO$
Navigation charges	$=0.5*stag*SQRT(MTO/50)$
Airframe maintenance	$= (0.09*AFW+6.7-350 / (AFW+75)) * (0.8+0.68*(blkt-0.25)) * LR + (MSP-NE*ENP) * (4.2+2.2 * (blkt-0.25))$
Engine maintenance	$=NE*(0.21*C_1*C_3*(1+SLS)^{0.4}*LR+2.56*(1+SLS)^{0.8}*C_1*(C_2+C_3))*(blkt+1.05)$
Fuel costs	$=fupr*blkf/fden$
Total sector costs	$=SUM(C17:C26)$
Total seat km costs	$=100* Total sector costs /stag/nsea$
Total seat mile costs	$=100* Total sector costs /sect/nsea$
Total Direct Cost	
Per block hour \$	$= Total sector costs /blkt$

Depreciation is a function of the utilisation rate and the time span of the aircraft. Usually the accounting practice is to depreciate the aircraft over 20-25 years, but here 20 is taken as the standard.

Total Investment (TI) is the sum of the Aircraft Price (MSP), Airframe spares, and the spare Propulsion Units (ENP, NE). The Airframe spares holding is calculated based on the scale of the airframe as attested by the size of the engine, hence the two engine parameters.

Interest and insurance are dependent on the price of the aircraft and its utilisation. Cockpit and cabin crew are paid according to the hours flown and the amount of passengers dictates the number of the cabin crew required.

Landing fees are expressed in terms of the aircraft weight. In this area however there have been numerous developments on pricing policy. Several airports have added passenger duties and environmental charges. Therefore as the study by the Cranfield University Air Transport Group for the AEA (1998)

concluded there is lack of conformity in the way charges are applied across Europe's main airports. For our calculations therefore we have taken the average cost per tonne of the aircraft related movement charges.

The two person cockpit crew are assumed at \$460/block hour each, based on the average remuneration package offered by a typical low cost airline in 2000. This was compared with the amount of aircraft hours the aircraft is flown, and the number of pilots employed by the airline taken from the CAA Statistics (2000b), thus deducing the number of hours each pilot flies (between 240 and 340 hours per year). Navigational charges are dependent on the stage length and the aircraft weight.

Airframe maintenance is a function of the flight time, (although by more recent trends it is flight cycle related), the airframe weight and the manufacturer's empty weight. The amount of flying the aircraft does and the level of complexity of the aircraft are also the main factors in the estimation of the cost of maintenance. Correspondingly, the type and complexity of the engine as well as its size, denoted by the Thrust rating, number of engines of the aircraft, number of stages and the corresponding airflow speeds through them are the main factors in estimating the cost of engine maintenance.

Fuel costs are simply price per gallon per fuel consumed per block hour, adjusted for the fuel density of Jet A kerosene.

Secondly, the results on the cost of operating as an airline are applied to a selected route network, using a variety of city pairs within Europe. Therefore the cost across the network is obtained. Hence, the total operating costs were formed using data about the ratio of Direct to Indirect costs from 4 UK airlines

representing each of the market segments. The data were obtained from the latest CAA annual surveys of Airline Operating Statistics. The airlines chosen were British Midland, easyJet, KLMuk and Monarch. Each airline represents individual market segments. The established independent carrier with a wide European network, the low cost carrier, the regional short haul feeder and the established charter airline respectively.

6.3.4 Simulation model description

The main aim of this simulation is to provide a way of evaluating the Direct Operational Cost of operating an airline schedule. This was undertaken by focusing on the aircraft type as this is the common denominator in any airline operation. Other items common to all airlines are landing charges, navigational charges, cockpit and cabin crew salaries, aircraft depreciation, interest on capital employed and maintenance of airframe and engines. The last two items are possible to be subcontracted to a third party supplier but will nevertheless feature as costs in the airlines' balance sheet.

All airlines have also to deal with Indirect Operating Costs (IOC). IOCs are costs that are not directly attributable to the costs of flying operations, or to any specific aircraft type been operated by the airline. Instead, they are associated with all the functions supporting flying operations and therefore are not dependent on the amount of flying accomplished.

They usually include items such as ground property and equipment, development and pre-operating costs, flight crew training, handling charges and parking fees, passenger embarkation fees and insurance, sales,

reservations, advertising and promotion, commissions, general and administrative station costs and passenger services. There are several standard methods of estimating, allocating and accounting for DOCs and IOCs, most notable been those of Boeing, the U.S. CAB/FAA and the UK Civil Aviation Authority.

Airlines have the flexibility to allocate these costs according to their accounting practice and therefore there is some variety as to under which heading each cost will be categorised. Nevertheless for the purposes of this research the categorisation in the airline surveys of the CAA will be followed and the above headings will be considered as indirect costs. The DOC is usually expressed either as the cost per seat kilometre or per mile flown.

When all the parameters and values have been inserted into the formulae a result for the total cost of this aircraft flying the sector (total sector cost) is derived in U.S. dollars. From that value the total seat kilometre cost is produced in terms of U.S. cents. Further results can be obtained for the total seat mile cost and the total direct cost per block hour, expressed in U.S. dollars. Further to obtaining these values, shares of each item as a percentage of the total sector costs are obtained and shown. This is useful as it can indicate differences in the economic characteristics between various types of aircraft. Additionally, a comparison can be made for the same type of aircraft operating in a different country or region i.e. Europe, USA, etc.

The total seat kilometre cost is then used in the tabulation of the 253 routes surveyed within Europe, details of which are described in the section below. In the route survey tabulation the initial value of the total seat kilometre cost is apportioned to each particular route sector length, giving a particular DOC per

seat kilometre for each individual route. As a result of the route survey the block times for each route have already been found and tabulated. The DOC per block hour, can be calculated by multiplying the DOC per seat kilometre with the number of aircraft seats available, the sector distance and divided by the block time. This should give a value of thousands U.S. dollars. Finally the direct trip cost is calculated as being the DOC per block hour times the block time.

At this point we have already found the cost of operating a particular aircraft type across a series of European routes, based on the expenses required for the aircraft flight. In this amount no account has been taken of the cost involved in all the supporting functions within the airline that operates this aircraft and which have to be recouped from the operational revenue of the aircraft, if the airline intends to break even. In other words all the Indirect Operational Costs have to be amortised in the overall flying operations. For this reason Indirect Operational Costs are expressed as a percentage of the airlines' Total Operating Expenses.

The level of Indirect Operating Costs are largely depended on the type of operation the airline performs and its characteristics. There is therefore great variety of this percentage share across the airlines. For the low cost airline sector in the UK the corresponding figures vary from between 47.89 percent and 65.92 percent. In comparison the integrated chartered airlines vary from between 27 percent to 53.14 percent, whereas the established carriers vary from between 48.54 percent and 63.17 percent, as shown in Table 6.1. Because of the wide disparity of these figures it was decided to create representative costs for each airline type. This has the added advantage of

showing the difference in costs attributed to the type of market segment each carrier is operating in.

	IOC Share of costs %	DOC share of costs %
<u>Established carriers</u>		
British Airways	59.00%	41.00%
Virgin	48.54%	51.46%
bmi	63.17%	36.83%
<u>Franchise carriers</u>		
GB AIRWAYS	49.66%	50.34%
Brymon	56.46%	43.54%
City Flyer Express	52.17%	47.83%
<u>Low cost</u>		
EasyJet	47.89%	52.11%
Go Fly	54.56%	45.44%
KLM uk	65.92%	34.08%
<u>Integrated operators</u>		
Monarch	41.31%	58.69%
Airtours	53.14%	46.86%
Air 2000	44.04%	55.96%
Britannia	48.52%	51.48%
Caledonian	36.56%	63.44%
JMC	26.86%	73.14%

Source: Compiled from CAA UK Airlines Statistics, 2000

Table 6.1 Comparison of costs for UK airline market segments

As mentioned earlier the airlines selected were bmi, easyJet, KLMuk and Monarch, each representing a particular market segment.

This was done by firstly calculating the breakdown between IOC and DOC for each airline and then applying it to the specific aircraft type, for each individual route. The values obtained showed the total trip cost for a specific aircraft type for every one of the 253 routes and the 43 short haul routes surveyed. This provided a wealth of city pair routes, each one costed according to a particular airline and a particular aircraft type of this airline, so that in the following module of schedule formulation it would allow the choice of any particular

route or set of routes for which costing information would be readily available¹⁹.

6.3.5 Route survey description

A survey of 253 routes within Europe was carried out, the distances between city pairs were measured and tabulated together with the estimated block times required as obtained from schedule data. A further survey of 42 short haul routes (less than 1500kms) was also undertaken to better clarify this segment. In the tabulation the Direct Operating Cost per block hour and the Direct Trip Cost were also calculated for each city pair.

An examination of the way the airlines schedule their services was carried out in order to find out the true flight times. It has been found that, particularly on short haul routes of less than 1200 km there is an overestimation on behalf of the airlines of the scheduled block time required. Block times sometimes varied between the outbound and inbound trips. This could be attributed either to operational reasons such as unfavourable routings (more circuitous route) on one leg or to congestion problems at the away airport.

‘Schedule Padding’ as this practice is called is encountered in short sectors where the actual flight time is a smaller proportion of the total flight time. Furthermore as more and more airlines oriented towards the business passenger and focus on punctuality performance, they overstate the block time so as to achieve on-time flights despite delays on the ground at congested airports. Some low cost airlines have chosen to avoid congested airports and fly instead

¹⁹ All aircraft and route data and results from this section are contained in file FLEET2DD.xls supplied on disk.

to empty secondary airports enabling them to maintain a 20 to 30 minute turnaround on the away landing.

A relationship between the distance and actual scheduled block time was obtained and fed back into the parameters of the original simulation. Differentiation between all routes and short haul routes was necessary in order to examine the short haul sector to a more accurate level. The benefit was to obtain an improved correlation between the block speeds and sector distance for stage lengths less than 1,000 km. So, for all the routes the relationship between block time and stage length was found to be :

$$\text{Block Time} = 0.0011165808 \times \text{stage length} + 0.612331570$$

$$R^2 = 0.97068$$

For short haul routes the relationship between block time and stage length was found to be:

$$\text{Block Time} = 0.0013590695 \times \text{stage length} + 0.496454844$$

$$R^2 = 0.80487$$

The corresponding relationships for the block speeds were:

$$\text{Block Speed} = 164.29966 \times \ln(\text{stage length}) - 613.90220$$

$$R^2 = 0.92129$$

For short haul routes the relationship between block speed and stage length was found to be:

$$\text{Block Speed} = 20.601 \times (0.4743 \times \text{stage length})$$

$$R^2 = 0.9252$$

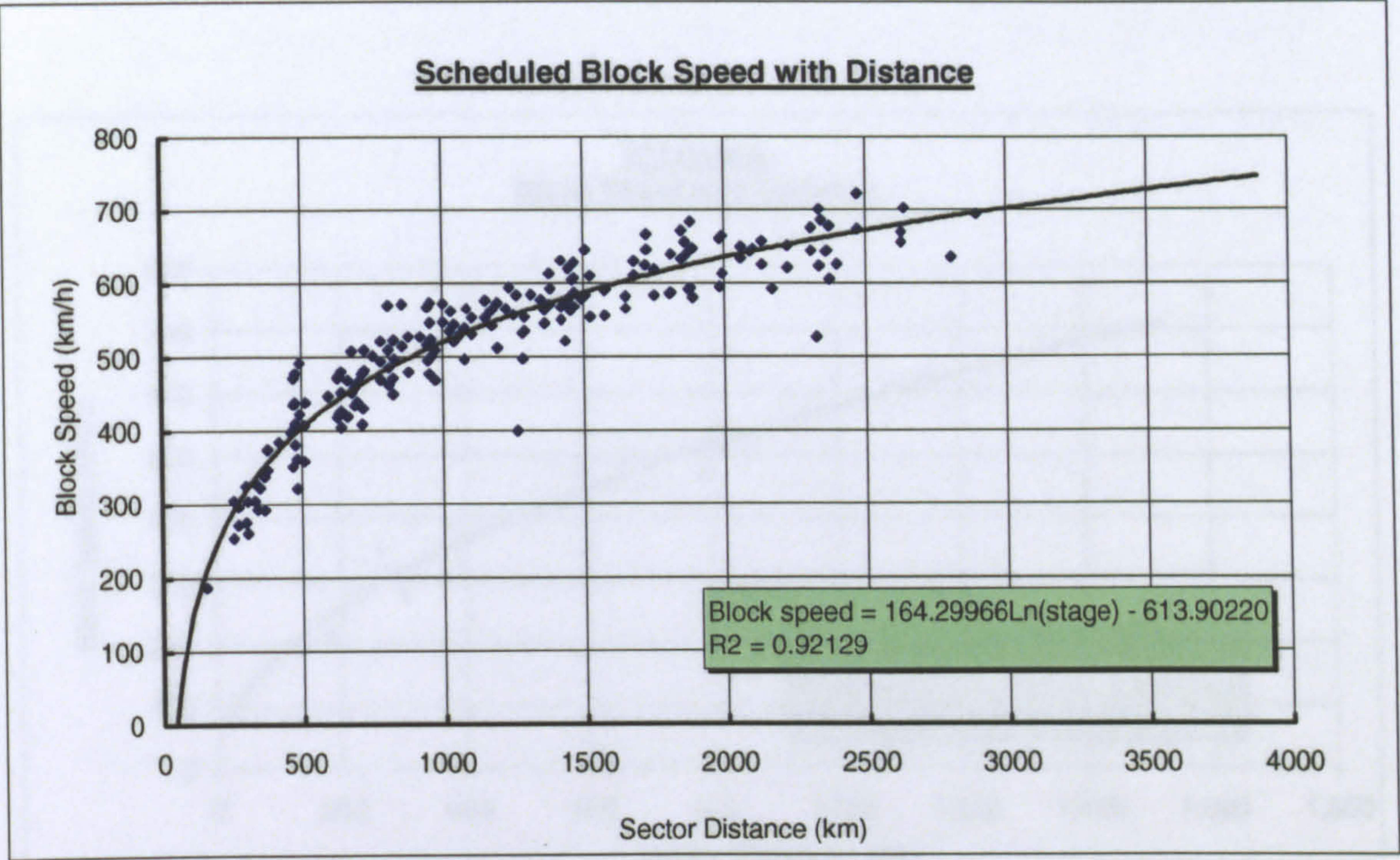


Fig. 6.1: Block speed with distance variation

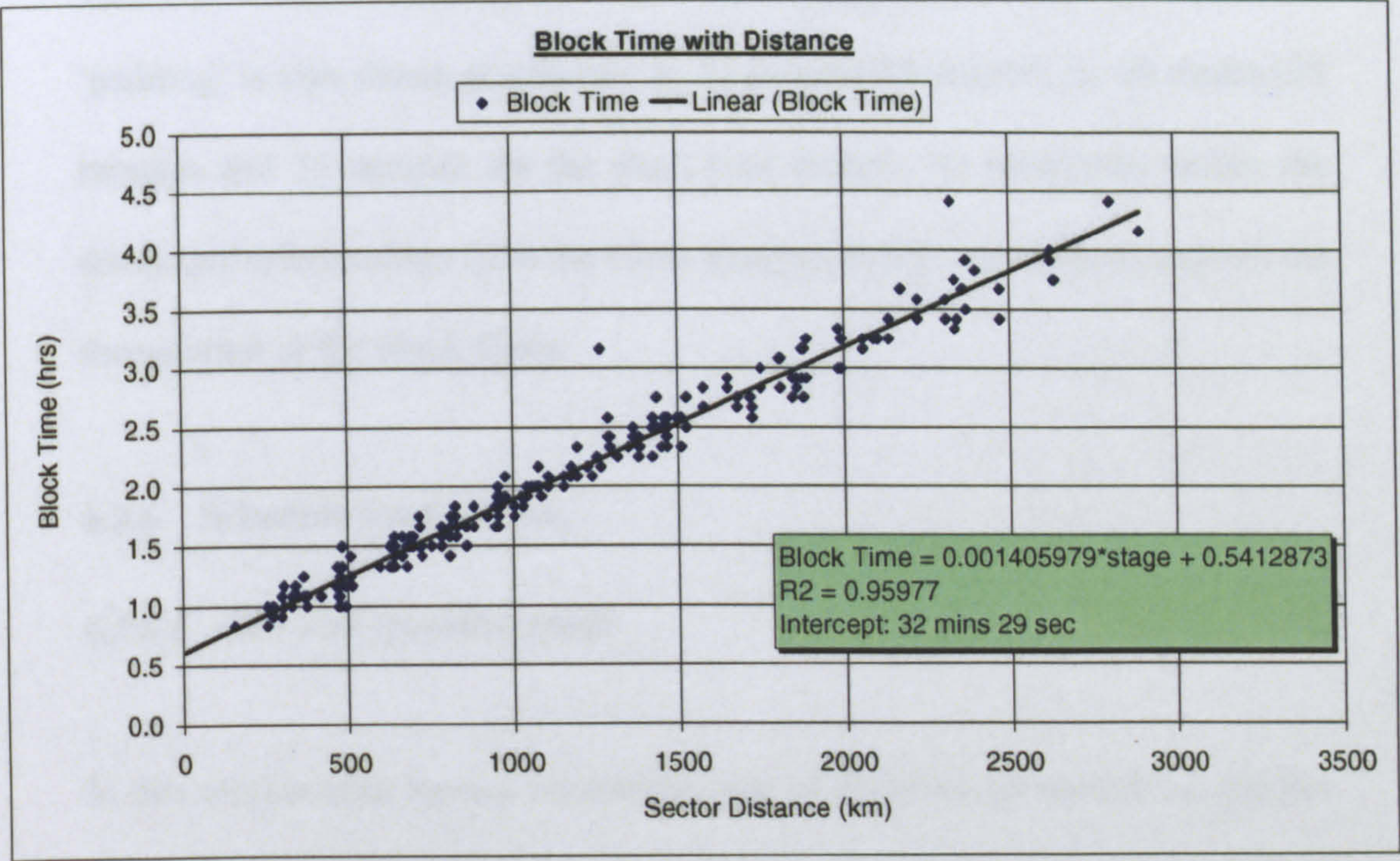


Fig. 6.2: Block time with distance variation

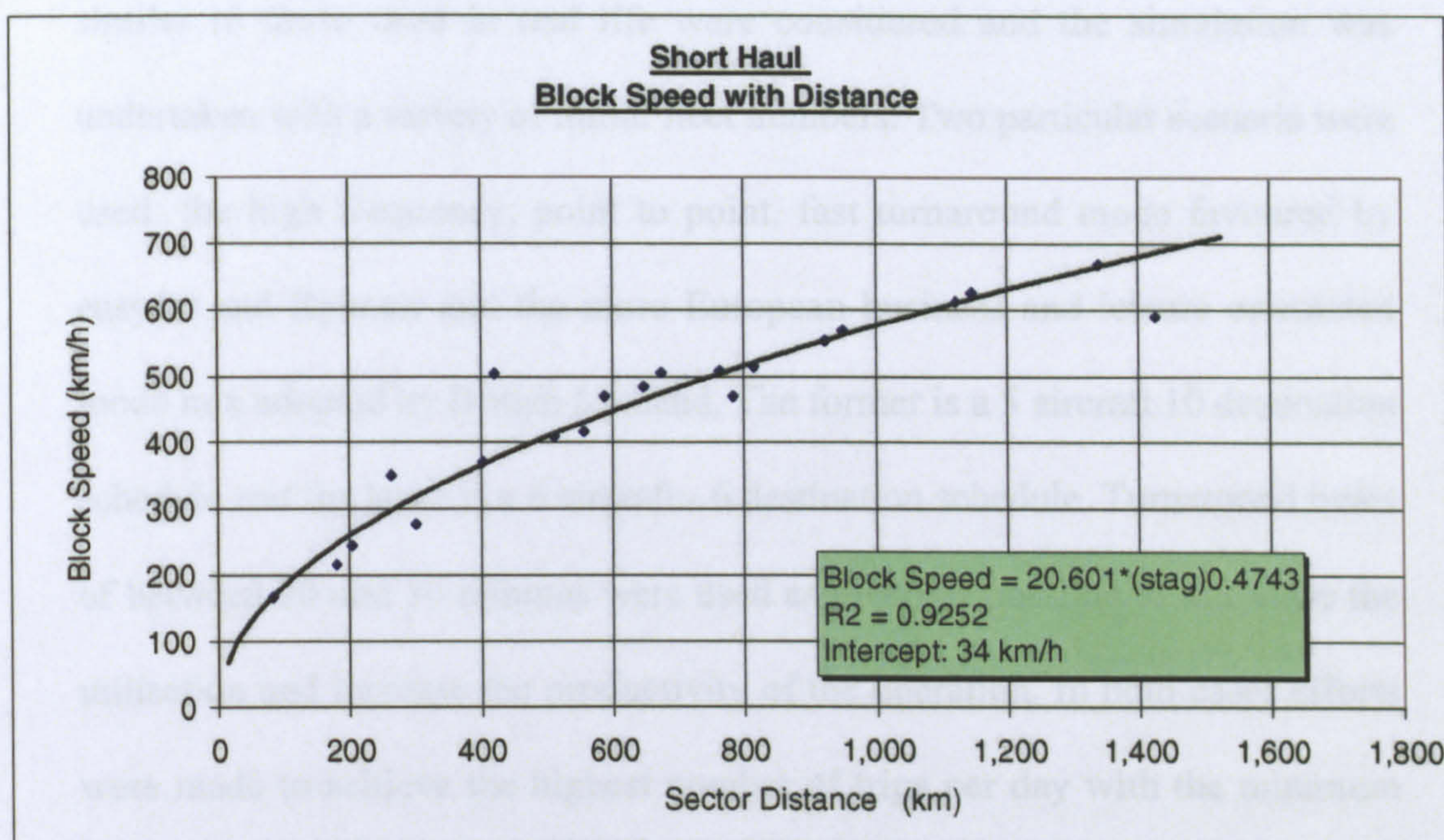


Fig. 6.3: Block speed with distance variation for short haul routes

This effect can be seen from Figs. 6.1, 6.2 and 6.3 where the amount of ‘padding’ is also shown graphically as 32 minutes 29 seconds for all routes (30 minutes and 33 seconds for the short haul routes). As mentioned earlier the developed relationships from the block analysis in this section were used in the formulation of the block times.

6.3.6 Schedule formulation

6.3.6.1 Low cost operation mode

In this section after having chosen the type of operation preferable i.e. the low cost carrier type of economics, a small scale operation was set up in order to discover the total schedule costs behind it, as well as to simulate the early

stages of a new carriers' operational start up. In the schedule,²⁰ destinations similar to those used in real life were considered and the simulation was undertaken with a variety of initial fleet numbers. Two particular scenarios were used: the high frequency, point to point, fast turnaround mode favoured by easyJet and Ryanair and the more European business and leisure orientated mode mix adopted by British Midland. The former is a 5 aircraft 10 destination schedule and the latter is a 6 aircraft - 6 destination schedule. Turnaround times of between 20 and 30 minutes were used as much as possible to minimise the utilisation and increase the productivity of the operation. In both cases efforts were made to achieve the highest number of trips per day with the minimum amount of aircraft.

For the low cost scenario, the mode of operation is one whereby each aircraft starts the day at the home airport and flies as many sectors a day on a maximum 30 minute turnaround at both ends of the sector. The selection of destinations was aimed to attract a mix of leisure and business passengers although the bias is definitely towards the leisure market segment. All daytime destinations are short haul with a maximum flying time of under 2 hours. This enables the operator to fly several rotations daily, particularly on the routes which have been identified as important. Experience in the U.S. and the European markets have shown that once low cost operators have identified suitable markets, they enter them at a fairly high frequency level in order to establish their market share quickly.

²⁰ All data and schedules are contained in file Schedules.xls contained in disk provided

In real life easyJet as a start-up carrier entered the domestic market to Scotland with 5 daily frequencies each to Glasgow and Edinburgh; it also flew 3 daily return trips to Aberdeen and Nice as well as 4 return trips to Amsterdam. However, initially it only flew once daily to Barcelona which is a 5 hour round trip.

This has been replicated as much as possible by providing four daily frequencies each to Paris, Dublin, Frankfurt and Amsterdam. London to Nice, Larnaka, Athens and Lisbon are once daily. It can be seen that these three destinations are leisure destinations which involve overnight flights. The choice was made in order to maintain a high utilisation rate, taking advantage of the long night hours as well as the fact that none of these airports have night time curfews. The distance of particularly the two Mediterranean routes are ideally suited to operating the aircraft on a pair of the longest intra European routes from London, during the night period which naturally has very little passenger appeal. In the schedule the departure times from London are reasonable times, and compare directly with those flown by real life scheduled airlines from London Heathrow. The arrival times back to London have the advantage of allowing the passengers to have a full day ahead of them. At the same time the aircraft is back in position ready to start another day's flying. From the daily utilisation table it can be seen that the two aircraft, numbers 5 and 2, involved in the trips to Athens and Larnaka have the highest utilisation score, 18 and 16.6 hours, respectively. In general, utilisation varies from 9 hours 20 minutes to 18 hours and 50 minutes, the fleet average being nearly 14 hours.

6.3.6.2 *European short haul type operations mode*

This schedule is based on the type of operation of a short haul European airline that is focused on a balanced mix of business and leisure passengers. It could be a similar type of airline as British Midland (bmi) which flies to most European capitals carrying business passengers at the beginning and end of the day, and leisure passengers in the rest of the day. bmi is a partner in one of the biggest alliances, the Star Alliance and has close links with SAS and most of its European flights are on a code share with Lufthansa, Scandinavian and United Airlines, all being major partners in the same alliance. Therefore it has to provide a connecting service to business passengers originating within the partner's networks as well as leisure destinations for its own passengers. A 30 minute turnaround is scheduled although this is up to one and a half hour longer for the real airline. Another factor which can not be avoided is the time difference between the UK and continental Europe which loses an hour on the outbound trip.

In order to satisfy both the business and leisure criteria, a schedule has been created focusing on frequent service to six major European capitals which have a dense enough traffic pattern to support several daily frequencies of both business and leisure passengers. In order to keep the number of aircraft to six, Dublin was not given more than two daily trips, so as to maintain a high frequency in all the other destinations. Because of the business traffic constraint, effort has been made to provide greater choice by having at least 2 frequencies in the morning periods. Paris, Brussels, Amsterdam, Copenhagen and Frankfurt all achieve this before midday. To a lesser extent the same has

been aimed at during the evenings, to cater for the returning business passenger. In the case of Copenhagen, because of the distance, night curfew at London and the time difference it was not achievable, so the aircraft stays there overnight. Having aircraft staying overnight away from the base is common practice for network carriers as it allows them to have aircraft in place for the early morning rotation to begin.

During the middle part of the day frequencies are allocated according to aircraft availability, with the general aim being to build up frequencies by as much as possible. Dublin leisure traffic is therefore catered in this section as well as during the return in the evening .

Overall with this schedule, 6 return trips per day to Paris, Brussels, Frankfurt are achieved, 4 to Amsterdam and Copenhagen and 2 to Dublin. Daily utilisation varies between 9 hours 20 minutes and 13 hours 20 minutes, with a fleet average of 11 hours 10 minutes. The current average for the short haul fleet of a large European network carrier is 6 to 7 hours, while bmi's latest data published indicate an average figure of between 7.5 and 8.5 hours per day.

6.3.6.3 *Schedule costing*

This section is aimed at providing the full information on the airline's complete scheduled operations. All the operational information achieved from the schedule is concentrated to give the full picture and to show to the managers a quick picture as to the profitability of each route.

In this stage the data from the schedules above are tabulated in such a way as to provide a summary of the block times, daily round trips and the passenger carried in each rotation. The fare charged is also applied to the traffic carried

and a complete breakdown of both total revenue and total expense is obtained. Finally, the profit or loss made on each route is shown together with the net margin.

Several schedule costings were created for the Boeing 737-300 and 737-400 and for the Airbus A320 and A321, to show which type is the more profitable on each type of operation. At this stage we depart from the assumption of the setting up of the cost model that all aircraft are filled up to a Load Factor of 75 percent, but in order to show the differences in the airline operation the real load factors and seating densities are applied. So for a low cost operator a seat load factor of 80 percent is used and for the short haul operator bmi's most recent load factor of 61.3 percent.

In order to have a complete picture of this operation the question is asked what would be the equivalent figure if a different airline was operating this schedule. This question is posed so as to examine the effect of applying the fully allocated Indirect and Direct Operating Costs from a different airline. Hence the schedules were first tested for all Airbus and Boeing aircraft using easyJet's cost breakdowns, then using bmi's cost breakdowns and finally an Airbus A 320 and A321 using Monarch's cost breakdowns.

6.3.7 Fares

In this section a survey of the fares charged by airlines was done for the corresponding destinations present. Here, using the two internet reservations companies Travelocity.co.uk and Expedia.com the lowest excursionary restricted fares for the city pairs were taken and used as a sample of the level of low cost fare system available in Europe by the established airlines. Fares were

for travel taking place between the 13/3/2001 and 21/3/2001 period including a Saturday overnight stay. The tickets are booked on 14 days minimum in advance and direct flights only are considered unless no direct connection was possible. Survey date was 27/2/2001 and airport and passenger taxes were not included in the fares. Currently these are the usual restrictions applied to the cheapest fares for passengers flying on non - low cost carriers.

The above are not comparable to the fare levels charged by Southwest and other U.S. low cost carriers. Historically, fare levels for the U.S. majors have been lower per mile than for Europe, and Southwest's are considerably lower than the major's. Nevertheless it will be a useful indication to the kind of discipline in maintaining a low cost base required if the aircraft are to be operated profitably with this kind of revenue stream. In Europe, as in many other countries the airlines have made their profits from the business traffic they have carried. Consequently, an opportunity always existed to add leisure passengers in tourist class without compromising their high yield traffic. In a low cost fare situation demand is generated only by the attractiveness of low fares and the operator does not have the high yield passengers to boost revenue and profits. Fares on low cost carriers usually have fewer restrictions and are mostly quoted on a one way basis, two one ways making up a return ticket. The aim here was to show the lowest fare that is currently available, despite the restrictions imposed. Currently easyJet states that they calculate their maximum fares to be half of the lowest full-unrestricted economy fare available by the price leader (usually BA in the UK). Sample fares for a variety of destinations flown by low cost carriers are shown :

LONDON To:	O.W. →	O.W. ←	Average RETURN
ABERDEEN	£ 24.50 - 44.50	£ 35 – 50	£35 - 80
AMSTERDAM	£ 29.50 - 34.50	£ 28.50 – 60	£30 - 50
ATHENS	£44.50 – 54.50	£ 40.50 – 60	£ 30-70
BARCELONA	£ 44.50 - 54.50	£ 50 – 70	£ 50 – 120
FARO	£ 34 – 154	£ 34 – 154	£ 190
GENEVA	£29.50 - 34.50	£ 72 –122	£ 40 - 90
GLASGOW	£22.50 - 74.50	£ 30 – 40	£ 25 – 60
HELSINKI	£90	£90	£170
IBIZA	£ 39 – 186	£ 39 – 186	£ 172
INVERNESS	£ 34.50	£ 50 – 60	£ 25-50
LYON	£80	£80	£130
MADRID	£44.50 - 54.50	39.9 – 59	£ 35-40
NICE	£160.50	£ 35 – 59	£ 25-60
PALMA	£ 84.50 -114.50	£ 70 – 89	£ 60-70
REYKJAVIK	£59 – 159	£59 – 159	£220
TOULOUSE	£130	£130	£140
ZURICH	£ 29.50 - 44.50	£ 41 – 72	£ 35 –120

Source: Compiled from individual airline data, 2001

Table 6.2 Low cost fares from London for Spring 2001

Additionally, for comparison purposes it was decided to include in the simulation an airline operation based on the economics of British Midland. British Midland is the largest independent scheduled airline in the UK and has the second highest amount of slots at London's Heathrow airport. It specialises in providing high quality business traffic to domestic and intra-European destinations as well as catering for leisure traffic on its network. It was chosen as an example of an efficient short haul airline with a good control of its costs which serves most of Europe's major airports. As British Midland relies on business traffic for a large part of its revenue it would be inaccurate to compare its revenue with a low cost model. Hence, a survey was undertaken to show the corresponding business fares that would be chargeable to its business passengers. For the simulation it was assumed that business class and economy

traffic account for 25 percent and 75 percent respectively of passengers on each flight. This level is representative of actual demand on a typical European route between major cities.

Further surveys were carried out to establish the fares offered by the low cost carriers. These carriers usually advertise their lowest fares in the form of one way fares. They usually are as low as £4 each way plus taxes. Prices like that are however misleading as there are only very few seats available at these fares and they have to be booked long in advance, particularly during busy summer periods.

In order to further investigate this tendency, a full search was undertaken for each fare class to each destination, for all UK low cost carriers. Fares quoted were for travel taking place between the 23/7/2001 and 31/7/2001 period including a Saturday overnight stay. The tickets are booked on 14 days minimum in advance for midweek travel.

The fares survey across different companies has revealed that there is a variety in sophistication of the fare setting policy. The fully flexible fares reach up to 20 times the lowest advertised fare. This leads us to believe that low cost carriers actually use an in house yield management system. This in turn means that the more experienced airlines' internal revenue and yield management systems are now able to adequately distinguish between their passengers in order to maximise their revenues. In examining the fare classes present the level of sophistication of the systems varied. The simplest found was that of 'buzz' and GO using linear fare relationships, whereas those of easyJet and Ryanair used non-linear functions. It is therefore logical to assume that the two

older airlines have had more time to adapt their booking system to their individual market needs.

Due to the increasing trend of internet bookings, which all the low cost carriers are encouraging, the passenger himself who is now the person booking the tickets, will encounter an increasingly complicated fare structure. In one case an airline had up to 8 different fare classes for the same destination. Although this compares well with the established airlines who have up to 50 different fare classes for the same trip the low cost carrier philosophy should include simplicity of fare setting.

Unlike Southwest, the European low cost carriers are actively trying to attract the price sensitive business passenger, but at the same time they try to segregate him from their standard leisure passenger. This aim leads them to develop this extended fare structure. Ryanair usually quotes the lowest minimum fare for most of the destinations it operates. It should be noted however that the fares quoted are not inclusive of taxes and other charges. If taxes are included then, in some cases, the fare could actually double. Buzz, easyJet and Go in contrast quote for an all inclusive fare. In general their fares are similar, although GO's are slightly lower.

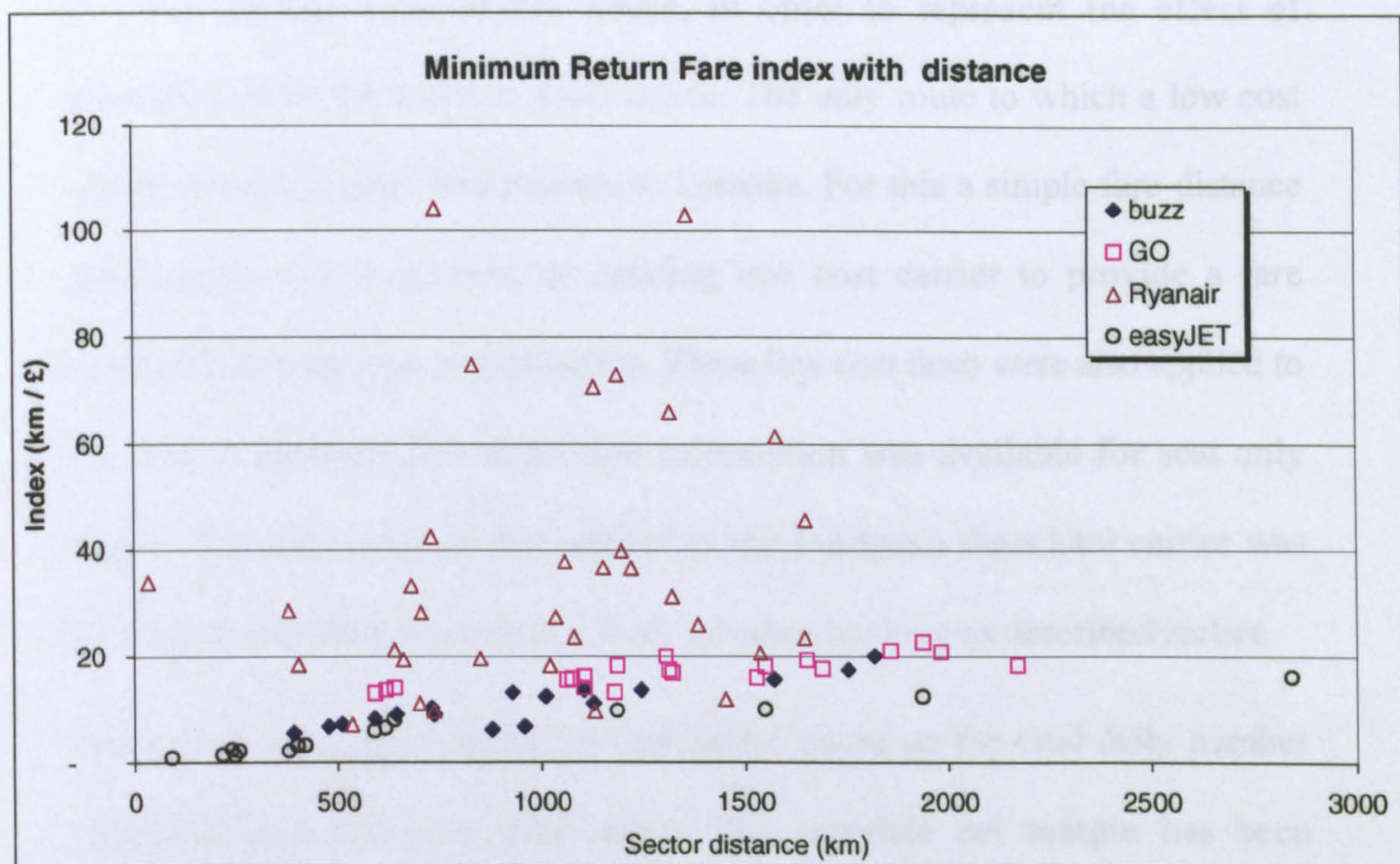


Fig. 6.4 Low cost fares in Europe

6.3.8 Comparison of results

The results of the simulation are summarised below. Firstly the data for the low cost mode schedule are shown. The annual number of passengers carried, the net profit margins and the average break even load factor have been calculated for this particular schedule.

In these estimations two sets of fares have been used. For the low cost carriers the average fares quoted for travel between the various UK companies are used. For each route the fare charged by an airline actually flying this route was used. For low cost carriers the average was calculated from airline data from the range of the lowest advertised fare with restrictions to the highest non restricted fare. In the case where the airline did not state restrictions for its fares but only a price then the average was taken for ranges of fares for periods

of travel spread over several weeks, in order to represent the effect of increasing value for travel at short notice. The only route to which a low cost carrier doesn't operate was London to Larnaka. For this a simple fare-distance relationship was used from an existing low cost carrier to provide a fare reasonable for the type of destination. These low cost fares were also applied to the charter carrier as no direct fare information was available for seat only flights. The other type of fare applied to the European short haul carrier was the lowest restricted fare with a 2 week advance booking as described earlier.

The annual passengers carried are calculated based on the total daily number projected to a full year (360 days). The schedule net margin has been calculated based on the ratio of the total network profit or loss to the total daily costs. The average break even load factor is the combined average of all the breakeven load factors for each individual route in the network. Individual break even load factors for each route have been calculated based on the ratio between the Operating Cost multiplied by the Revenue Passenger Kilometers to the Operating Revenue multiplied by the Available Seat Kilometers. This ratio takes into account the characteristics of each route in terms of its potential for profitability at the current fare levels.

6.3.8.1 The low cost schedule

Summaries of the results obtained are shown in Table 6.3.

LOW COST CARRIER TYPE OPERATION				
AIRLINE TYPE	AIRCRAFT TYPE	Yearly passengers carried	SCHEDULE NET MARGIN	Average Break Even Load Factor
Low Cost	B 737-300	2,042,640	30.60%	71.41%
	B 737-400	2,319,120	28.73%	71.82%
	A 320-200	2,543,616	25.79%	67.65%
	A 321-200	3,065,760	46.27%	63.68%
European Short Haul	B 737-300	1,203,120	15.35%	56.26%
	B 737-400	1,458,720	20.33%	53.43%
	A 320-200	1,583,280	40.63%	46.24%
	A 321-200	1,904,400	34.74%	48.13%
Charter	A 320-200	2,457,360	65.45%	54.59%
	A 321-200	2,965,680	59.60%	56.54%

Table 6.3 Low cost results comparison

As expected the passengers carried annually increased with increase in aircraft size. If similar aircraft types are compared across different operation modes then the low cost operator carries 69.8 percent more passengers (B737-300), 59 percent more (B737-400), 60.6 percent more (A320) and 61 percent more (A321). Comparing with the charter carrier with the low cost carrier the latter is enplaning 3.5 and 3.4 percent more on the A 320 and A321 respectively.

In general, the schedule net margins of the low cost carrier are higher than for the European short haul carrier and lower of the charter carrier. Variations exist across the different aircraft types due to their different operating economics.

Net margin varied with aircraft size increase for same manufacturer aircraft, the exception being the European short haul carrier's A321.

There is a discontinuity when changing from the Boeing 737-400 to the Airbus A320. It could be explained by the fact that the Airbus is operated with 184 seats compared to 168 seats of the 737-400, a 9 percent difference and yet the A320 at 73.5 tonnes is 17 percent heavier than the 737-400. Furthermore the type of powerplant might play a significant role. Both the 737 series and the A320 are powered by CFM engines, the former by the CFM 56-3 and the latter by the CFM 56-5. Although both engines are of the same core, they have different thrust ratings and the sub model powering the A320 is a later more refined derivative development of the -3 model. The best schedule net margin achieved for the low cost carrier is by the A321, by the A320 for the short haul European carrier and the A 320 for the charter carrier.

The European short haul carrier in general, achieves lower net margins than the low cost carrier. European operators tend to configure their aircraft with a lower seating density and fly with lower seat load factors, consequently suffering reduction in passenger numbers explained. However this is counterbalanced by the benefits of mixing business traffic with leisure. The 737-400 had been the mainstay of bmi's European fleet, although now it is re-equipping with an all Airbus fleet to increase its capacity. In general the A320 is a very widely used aircraft on intra European operations.

The average break even load factor broadly remains constant for the low cost carrier with increased aircraft size, but declines for the european short haul and charter carriers. This is the expected result as with a higher capacity aircraft proportionally more passengers are needed to achieve break even. The Airbus

of the European short haul carrier is the exception, as B.E. Load Factor is slightly higher for the A321. The best breakeven load factors are achieved by the A321 for the low cost carrier, the A320 for the short haul European carrier and the A320 for the charter carrier.

As a result of the different type of operations the European short haul carrier suffers a cost disadvantage on the net schedule margin over the low cost carrier which varies between 8 points to 15 points. The exception to the rule is the A320, which has a better net margin to that of the low cost carrier by nearly 15 percentage points.

No calculations for the 737 series of aircraft were undertaken for the charter segment as most operators have now outgrown this size and their smallest aircraft for short to medium haul operations is a combination of the A320 and the A321. For the charter carrier schedule net margins between 65 percent and 60 percent were obtained with an associated break even load factor of 54.6 percent and 56.6 percent. The calculated cost difference on the net schedule margin with respect to the low cost carrier is 39.7 and 13.3 percent for the A320 and A321 respectively in favour of the charter carrier. The corresponding differences on breakeven load factor are 13.1 and 7.1 points lower than the low cost carrier. The results obtained here are over optimistic as in reality most charter airlines have break even factors above 80 percent or in the low 90 percent region. They also operate on much smaller margins than those obtained here. The explanation lies in the nature of the business of the integrated charter operator.

The charter airlines usually fly on behalf of a tour operator they are paid directly by the tour operator who fills up their capacity *en block*. Therefore

they receive a far lower payment per passenger than the minimum restricted fare quoted by scheduled airlines in Europe. Obtaining data on the level of these payments is almost impossible. They can afford to reduce their revenue because their indirect costs are low since most of the reservations, advertising and other non core functions are carried out by the tour operator and because they fly more efficient operations. In our results the calculation for the charter operators were carried out using the same fares as those charged by the low cost carriers. However this is misleading because although the fares might be similar, the revenue is collected by the tour operator, so there is no way of knowing the actual amount reaching the airline. In reality they would be much lower.

6.3.8.2 The European high frequency schedule

Summaries of the results obtained are shown in Table 6.4.

EUROPEAN HIGH FREQUENCY TYPE OPERATION				
AIRLINE TYPE	AIRCRAFT TYPE	Yearly passengers carried	SCHEDULE NET MARGIN	Average Break Even Load Factor
			%	%
Low Cost	B 737-300	2,299,680	36.96	71.13
	B 737-400	2,610,720	32.40	73.58
	A 320-200	2,859,840	58.80	61.35
	A 321-200	3,450,960	52.80	63.76
European Short Haul				
	B 737-300	1,356,480	19.73	53.52
	B 737-400	1,642,320	27.92	49.21
	A 320-200	1,784,160	52.27	41.31
	A 321-200	2,143,440	45.72	43.17
Charter	A 320-200	2,766,240	71.57	54.93
	A 321-200	3,337,920	65.09	57.09

Table 6.4 European High Frequency results comparison

Increasing the aircraft size of the low cost carrier's B737-300, there are increases in passengers enplaned of 13.5 percent, 9.5 percent and 20.7 percent. Similarly for the European short haul carrier the corresponding increases are 21 percent, 8.6 percent and 20.1 percent. For the charter carrier when changing to the A321 from the A320 there is an increase of 20.7 percent.

If similar aircraft types are compared across different operation modes then the low cost operator carries 69.5 percent more passengers (B737-300), 59 percent more (B737-400), 60.3 percent more (A320) and 61 percent more (A321). In

comparison with the charter carrier the low cost carrier is enplaning 3.3 percent more passengers on both the A320 and A321.

Net margins start from nearly 36.9 percent for the B737-300 to the highest of 58.7 percent for the A 320 of the low cost carrier. Break even load factor in general follows the trend of increasing with aircraft size increases. The best net margin and break even load factor are achieved by the A320 and A321 respectively.

The European short haul carrier's net margins are broadly in line with the previous findings. The B737-300 produces a low margin, at 19.7 percent but as the size is increased it changes to a maximum of 52 percent for the A 320. With further size increase to the A 321 the net margin is reduced to 45.7 percent. This is a similar observation to the low cost carrier mode where the A321 suffered a reduction. As in the previous mode the best break even factor is also observed for the same aircraft type, the A321, at 43.2 percent, However the margin and the breakeven load factor here are lower respectively. As before, the best net margin and breakeven load factor is achieved by the A320 and A321 respectively.

The charter carrier achieves net margins higher than the low cost carrier with breakeven load factors of 71.6 and 65.1 percent. As already explained, the net margins and break even factors achieved are very optimistic, since in our model it was impossible to have accurate data for the revenue a charter

company obtains from the tour operator for its flying operations. Consequently the breakeven load factor is also very low, as in reality it would be expected to be in the region of 80 to 85 percent. Despite this apparent inaccuracy the results clearly show the potential for low cost travel that the charter carrier has.

6.3.9 Sensitivities of Net Margin Variation

Having established a working model of the different types of schedules for the three separate market segments it is important to understand how this model responds to changes in the operating environment. For this reason it is necessary to calibrate this model according to its various parameters. The important parameters that are changeable are the seat load factor, and number of daily trips or frequencies. By varying these in turn for each aircraft type, changes in the schedule net margin will be observed and from this a better understanding of the underlying trends can be established. Furthermore evidence about the number of passengers carried on each schedule can be obtained, which will become useful in the later stage. The average breakeven load factor is not dependent on variation of the seat load factor but on the operating revenue, the operating expenses, the Revenue Passenger Kilometers and the Available Seat Kilometers and for this reason it has not been tracked in this part of the analysis.

6.3.9.1 The low cost schedule

The seat load factor was reduced from 15 points above to 20 points below the nominal level. This was carried out for each of the three market segments. For

each change in seat load factor the number of annual passengers and the schedule net margins for all aircraft types were tracked and tabulated. The results are shown in Fig. 6.5 overleaf.

From a general examination it is apparent that results for the types are closely grouped. The short haul European types are concentrated towards the lower part of the analysis graph. The low cost mode aircraft are predominantly in the middle region and the top is taken up by the charter mode types. Comparing the three groups, it is evident from the relevant gradients of the lines obtained that the low cost types exhibit a lesser sensitivity to the variation in seat load factor than the short haul and charter types.

This is further demonstrated by the fact that initially in the lower seat load factors the european short haul grouping, as a whole, achieved lower net margins (negative) than the low cost group. However around the 10 points less than the nominal L.F. its A320 and A321 start overtaking the low cost A320 and 737-300. Examining the short haul group, the 737-300 crosses the borderline between a positive and negative net margin at 5 points less nominal load factor.

The other types of this group are slightly better in that respect, with the best performer being the A320 which remains in positive net margins until just before 20 points lower than the nominal.

The differences between types of the same group seem to be amplified in this type of schedule mode.

Schedule Net Margin Sensitivity to Seat Load Factor
Low Cost Schedule

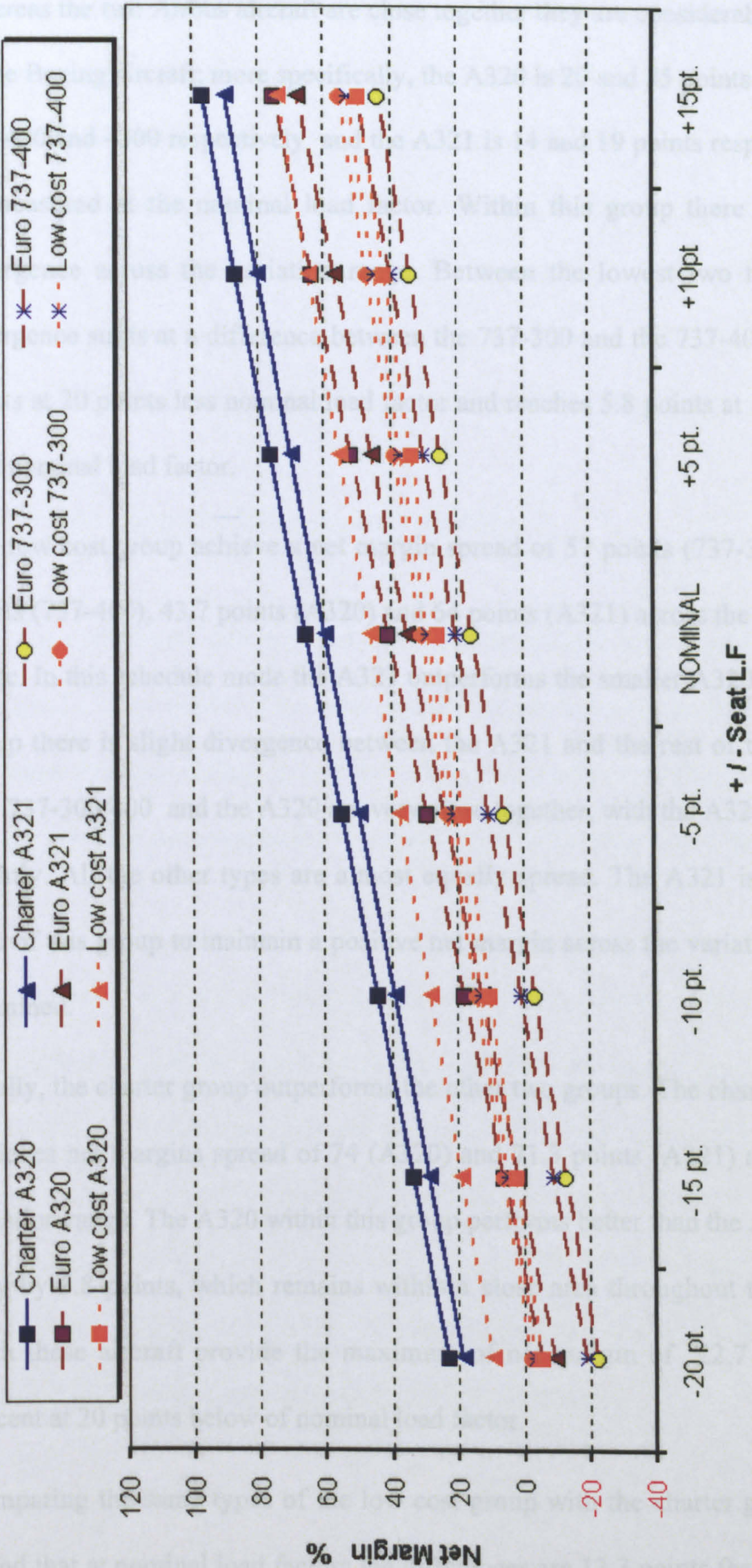


Fig. 6.5 Low Cost Net Margin Sensitivity

Whereas the two Airbus aircraft are close together they are considerably ahead of the Boeing aircraft; more specifically, the A320 is 20 and 25 points from the 737-400 and -300 respectively and the A321 is 14 and 19 points respectively, as measured at the nominal load factor. Within this group there is slight divergence across the variation range. Between the lowest two types the divergence starts at a difference between the 737-300 and the 737-400 of 3.3 points at 20 points less nominal load factor and reaches 5.8 points at 15 points plus nominal load factor.

The low cost group achieve a net margin spread of 57 points (737-300) 56.4 points (737-400), 43.7 points (A320) and 64 points (A321) across the variation range. In this schedule mode the A321 outperforms the smaller A320. For this group there is slight divergence between the A321 and the rest of the types. The 737-300/400 and the A320 are very close together, with the A320 lagging slightly. All the other types are almost equally spread. The A321 is the first type of this group to maintain a positive net margin across the variation range examined.

Finally, the charter group outperforms the other two groups. The charter group achieves net margins spread of 74 (A320) and 71.3 points (A321) across the variation range. The A320 within this group performs better than the A321, but only by 5.8 points, which remains within a close area throughout the range. Both these aircraft provide the maximum of net margin of 22.7 and 18.4 percent at 20 points below of nominal load factor.

Comparing the same types of the low cost group with the charter group it is found that at nominal load factors the differences are 13.3 points for the A321 and 39.7 for the A320. The reason for the low result for the A320 is that is the

lowest performer in the low cost group whereas the low cost A321 is the highest and has the better difference. Generally, taking the differences between the two closest types of the two groups it is shown that the low cost carrier has operating economics superior to the European short haul carrier and slightly inferior to those of the charter. However considering that the real results for the charter obtained were expected to be much lower, then the low cost carrier has the potential to be the best performer of all the groups.

6.3.9.2 The European high frequency schedule

The seat load factor was reduced by from +15 points, to -20 points of the nominal level as before. This was carried out for each of the three market segments. For each change in seat load factor the number of annual passengers and the schedule net margins for all aircraft types were tracked and tabulated.

The results in Fig.6.6 show the performance of each aircraft type in terms of how profitably it can be operated with reduced seat load factors. In general the 737-300 and 737-400 aircraft in the European short haul operation exhibit the lowest variation of net margins with changes in the seat load factor. The next best group is the aircraft in the low cost operation and the highest are the charter mode aircraft. Across the variation limits examined, all the Euro short haul Boeing types showed a negative schedule net margin.

Schedule Net Margin Sensitivity to Seat Load Factor **European High Frequency Schedule**

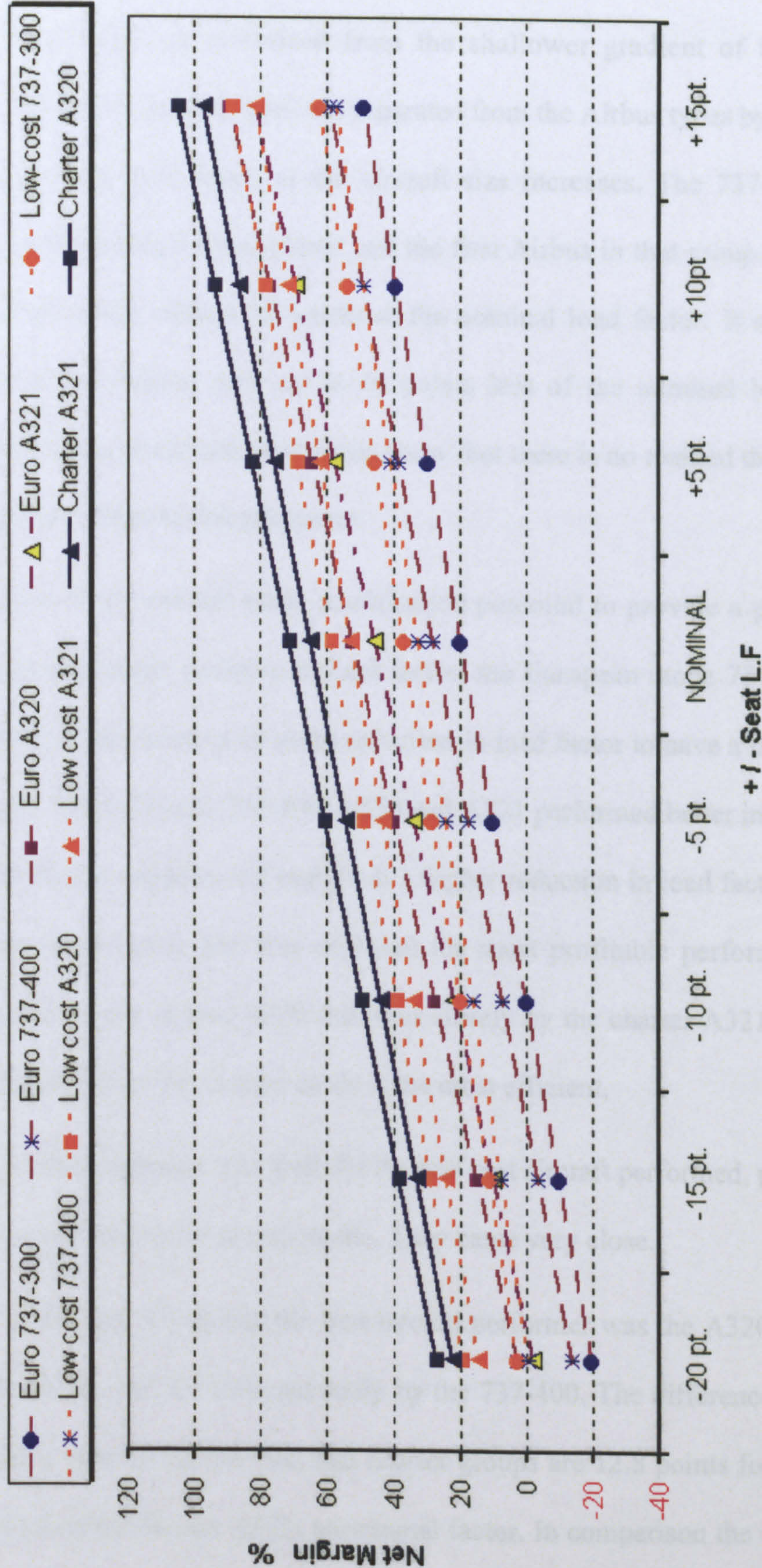


Fig. 6.6 European High Frequency Seat Load Factor Sensitivity

The aircraft in low cost operation are the less sensitive aircraft in changes to the load factor, as evidenced from the shallower gradient of their lines. European mode Boeing types are separated from the Airbus types by a constant margin from each other, as the aircraft size increases. The 737-300 has a margin difference between itself and the first Airbus in that group, across the variation range, almost 26 points at the nominal load factor. It maintains a positive net margin only up to 10 points less of the nominal load factor. Aircraft types in the low cost group show that there is no marked difference in their sensitivities to this parameter.

In terms of the aircraft mode combination potential to provide a positive net margin with great variation in load factor, the European mode 737-300 fares worst as it only needs a 10 point reduction in load factor to have a negative net margin. The European 737-400, A320 and A321 performed better in that order, by reaching a negative net margin at a higher reduction in load factor. For the region of variation that was explored the most profitable performance was achieved by the charter A320 followed closely by the charter A321. This was as expected since the charter mode is the most efficient.

The question remains how well did the low cost aircraft performed, particularly when compared to the charter mode. They came very close.

Out of the low cost group the best overall performer was the A320, followed by the A321, the 737-300 and lastly by the 737-400. The differences between the same type in the low cost and charter groups are 12.8 points for the A320 and 12.3 points for the A321, at nominal factor. In comparison the differences

with the short haul group are 18.8 points for the A320 and 19.4 points for the A321. Between the low cost and the short haul group, the differences for the same types were: 6.5 points (A320), 19.4 points (A321), 4.5 points (737-400), 16.9 points (737-300).

The low cost group achieve net margin spread of 60 points (737-300), 58 points (737-400), 69.5 points (A320) and 66.9 points (A321) across the variation range. In this schedule mode the A321 outperforms the smaller A320. For this group there is no obvious divergence. The Boeings are very close together, and so are the Airbuses. Between the two makes there is significant diversion. The 737-400 is the only type of this group to reach a negative net margin across the variation range examined.

The short haul group achieves net margin spreads of 68.3 points (737-300) 73 points (737-400), 92.1 points (A320) and 83.3 points (A321) across the variation range. Finally, the charter group outperforms the other two groups. It achieves net margin spreads of 77.6 (A320) and 74.7 points (A321) across the variation range. The A320 within this group performs better than the A321, but only by 6.5 points which remains within a close area throughout the range. Both these aircraft provide the maximum of net margin of 27.24 and 22.43 percent at -20 points of nominal load factor.

6.3.10 Passenger analysis

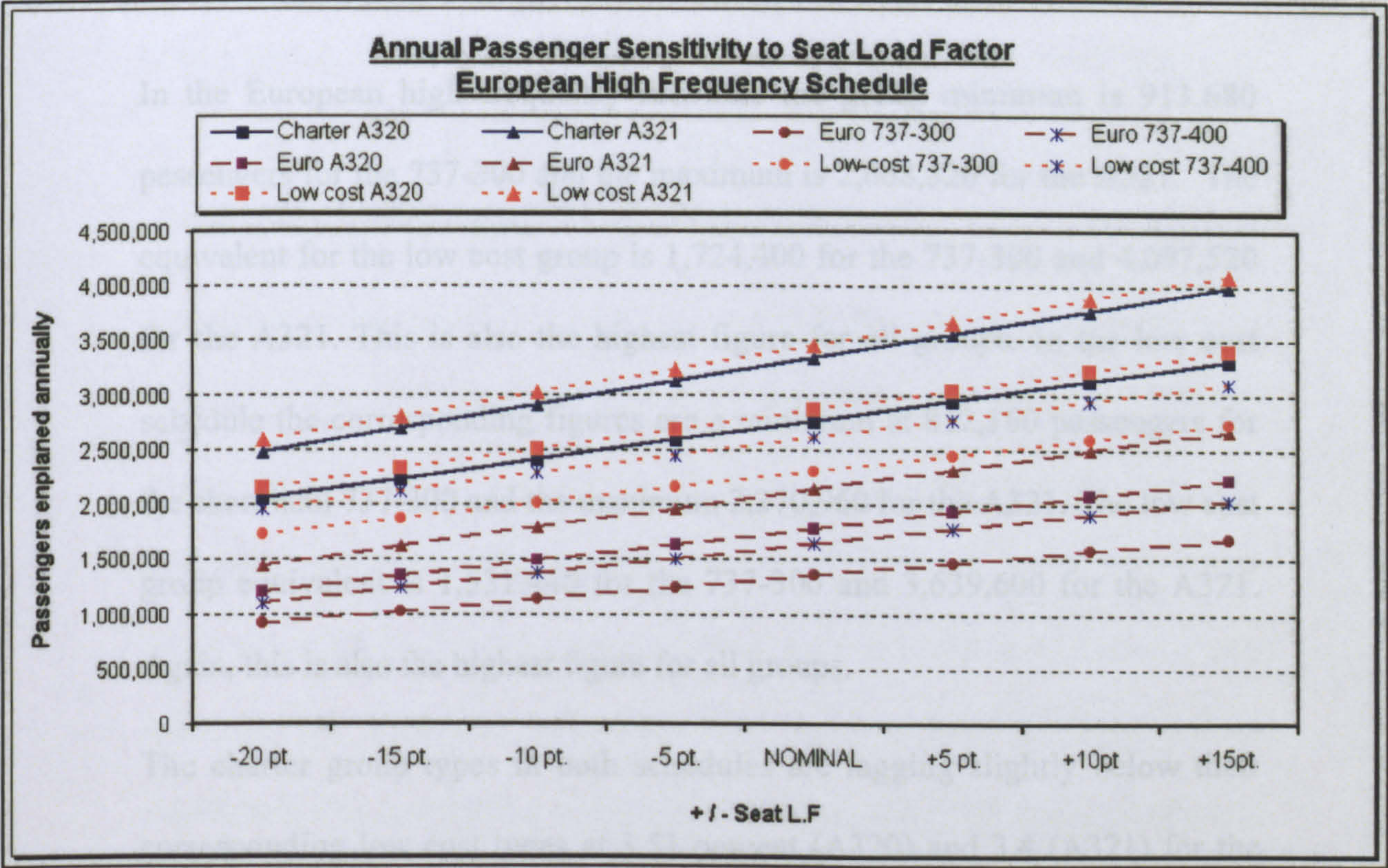
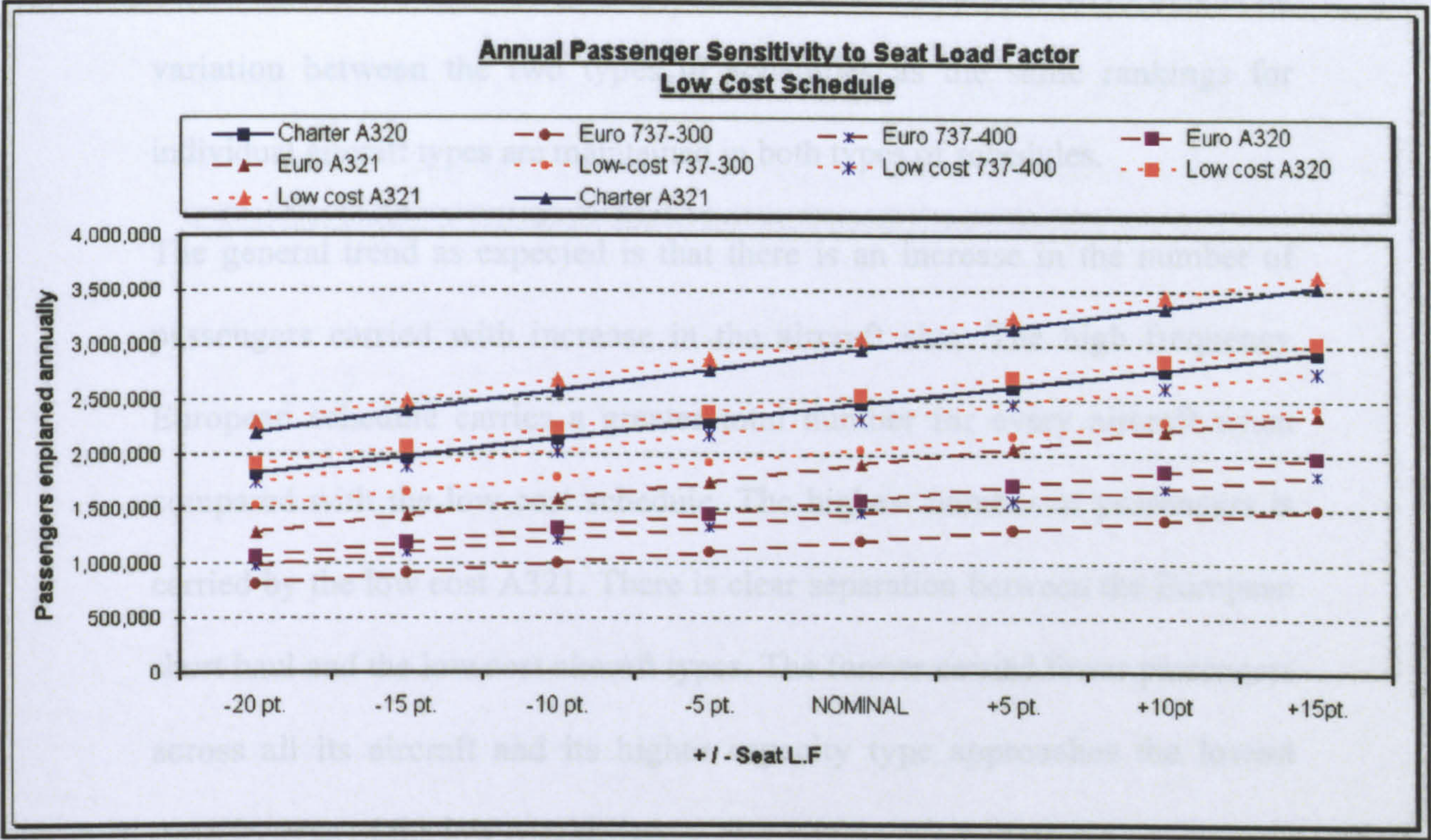


Fig.6.7: Passenger Sensitivities to Load Factor

The effects of variation of seat load factor on the annual passenger numbers for the low cost and high frequency schedules are shown in Fig. 6.7. There is no variation between the two types of schedules as the same rankings for individual aircraft types are maintained in both types of schedules.

The general trend as expected is that there is an increase in the number of passengers carried with increase in the aircraft size. The high frequency European schedule carries a greater total number for every aircraft when compared with the low cost schedule. The highest number of passengers is carried by the low cost A321. There is clear separation between the European short haul and the low cost aircraft types. The former carried fewer passengers across all its aircraft and its higher capacity type approaches the lowest capacity type of the low cost airline.

In the European high frequency schedule the group minimum is 913,680 passengers for the 737-300 and the maximum is 2,668,320 for the A321. The equivalent for the low cost group is 1,724,400 for the 737-300 and 4,097,520 for the A321. This is also the highest figure for all groups. In the low cost schedule the corresponding figures are a minimum at 812,160 passengers for the short haul 737-300 and the maximum 2,370,960 for the A321. The low cost group equivalent is 1,531,440 for the 737-300 and 3,639,600 for the A321. Again, this is also the highest figure for all groups.

The charter group types in both schedules are lagging slightly below their corresponding low cost types at 3.51 percent (A320) and 3.4 (A321) for the

low cost schedule and 3.3 percent for both A320 and A321 for the high frequency schedule.

In summary, it was found that analogous results are obtained across the two different schedules with the only variation being the increased number of passengers carried in the high frequency schedule. It therefore appears that the high frequency schedule is a more productive method of operation. This must be set against the fact that the high frequency schedule uses 6 aircraft in order to serve 6 destinations whereas the low cost schedule uses one aircraft less to serve three destinations more. Furthermore, consideration must be taken of the fact that in reality European short haul airlines similar to bmi have much longer turnaround times at both ends of their sectors, necessitated by the higher standards appropriate for their business traffic. Therefore the 30 minute minimum turnaround applied in our high frequency schedule is very optimistic. One hour to 90 minutes would be more representative, particularly in congested airports. It was used to show the possible economics of such operations for such an airline.

Additional examination of the data in the schedules indicates that in the high frequency schedule there are a total of 27 frequencies, compared to a total of 20 for the low cost. If a longer turnaround time is applied to the European schedule then the number of rotations per day will decrease, which will impact the number of passengers carried on an annual basis. Between the two schedules the difference in 'productivity' i.e. how many passengers each schedule is able to transport is approximately between 11.00 and 11.2 percent, in favour of the high frequency schedule, for all types of aircraft and airline groups examined in this model. It remains the same across the variation of the

load factors. However, this difference is not very large and if we had comparisons with the same amount of aircraft then clearly the low cost schedule is the more efficient and productive of the two.

7 MEETING PASSENGER TRAFFIC

7.1 INTRODUCTION

A small airline has been created and tested under two different modes of operation. During the simulation of flying operations the economics of the low cost carrier and two other types have been examined. Therefore from this testing procedure it is now obvious that the original setup parameters in estimating all the individual shares included in the Direct Operating Costs of an airline have performed fairly accurately and according to expectations.

In the initial setup of the schedules the destinations were selected by a rough method of mixing both business and leisure points, in a similar manner to what the low cost carriers have tended to do in real life. On these occasions domestic and international routes which had considerable traffic but were undeserved by two incumbent carriers were targeted at the start. The new entrants in their choice of routes have chosen to use either primary or secondary airports or a combination of both. Having made their market entry operating a similar number of aircraft as in our schedules and having established their market, then they seek ways to expand their network. This phase however is a difficult one for many reasons. Firstly, because these airlines have achieved a market presence, the majors are monitoring them

closely. Secondly, choice of new routes²¹ becomes critical as a wrong choice could lead to problems later. Expansion usually has to be carried out in a rapid and dramatic fashion, achieve a substantial presence in the market and gain the benefits due to scale this brings.

For these purposes the next phase will have to evaluate which are appropriate routes suitable for the low cost carrier to enter. There are signs that routes are chosen even on a seasonal basis, i.e. winter sports, summer holidays and year round short breaks, as well as established V.F.R. routes like London to Ireland, Spain and Greece. Some routes that do not support year round services because of their nature, are not operated during their off- peak season at all. Flexibility to choose routes according to seasonal traffic patterns is very important for the low cost carriers, but quite unusual for the scheduled airline sector.

Conversely the low cost sector will quite readily enter a route even under trial and will just as readily discontinue it if it does not achieve the expected returns.

This ability is in part due to the nature of the destinations and airports served by these carriers.

The airports chosen usually are not slot constrained and do not require several entry requests until permission is granted. This section will examine the means an airline can use to carry out such a task.

²¹ Sunk costs on new routes are likely to be high. European airlines estimate the introduction of

7.2 ROUTE EVALUATION

7.2.1 Plan and layout

To perform such a task it was necessary to identify routes that had the potential for low cost new entry. In this reference was made to CAP 685 (CAA 1998) where in Appendix O a number of routes both intra-European and domestic have been identified as possible candidates for new entry. In the CAA's consideration these routes were intended as new routes for existing established airlines and not for the low cost sector. However if a potential for an established carrier existed then the low cost operator could potentially be as successful in operating them, provided that they are dense enough to generate the necessary traffic.

The aim of this exercise is to estimate the number of frequencies possible if a low cost operator dedicated one aircraft to fly continuously on a route. Following that, assuming that the new entrant could capture 65 passengers per flight then what market share would that achieve if all else remained unchanged.

The passenger traffic for the selected routes was firstly tabulated. The section below describes the method of data collection and filtering of unwanted elements. The number of frequencies for end of 1997, 1998, 1999 and most recently for February 2001 were gathered together with the number of competitors in each route. Having the complete number of frequencies and

a new route to cost £ 10-12 million, in 1992. Betts and Gardner (1992) via G. Nero (1994)

annual passenger traffic the number of passengers per aircraft were calculated for the route before the new entry occurred.

Hence, initially given a single aircraft operation with a 30 minute turn around between 6.30 a.m. and 11.30 p.m. the rotations achieved in a day, and how many passengers would be captured in total were calculated. These calculations depended solely on how many rotations are possible given the time available to the operator to fly his single aircraft continuously within each city pair. Following entry the number of passengers per aircraft is once again calculated to show the impact of the new entrant on a daily basis on each route. The market share of passengers assumes that a linear relationship exists between frequency and passengers enplaned. As mentioned earlier this was based on the new entrant capturing 65 passengers per flight.

In CAP 654 (CAA, 1995) it is stated that an airline's market share is influenced more than proportionately by its frequency share. This means that the carrier with, say, a 60 percent frequency share will actually achieve an even higher market share than 60 percent. It proposes that a more realistic correlation follows an 'S' curve theory based on the formula of:

$$\frac{m_1}{m_2} = 2 \times \left(\frac{f_1}{f_2} \right) - 1$$

where m_1 is the market share of the competitor with the highest frequency share f_1 and m_2 is the market share of the competitor with the lower frequency share f_2 .

The simple effect of the 'S' curve theory is to produce a smaller optimum aircraft size, for any new entrant. The incumbent's advantage will be that it will probably be already operating a larger aircraft than the new entrant although this could be attributable to other factors such as lack of slot availability, and the need to offset a higher cost base, as bigger aircraft are cheaper per seat.

Taking this into account a separate formulation was carried out to conform to the 'S' curve theory and to show that given the new entrant's possible frequency, and the other competitors existing frequencies what passenger and market share could be achieved by the new entrant. Finally this was translated into passengers per day for the new entrant and the number of rotations possible to transport these passengers in the low cost operator's 737-300 or 737-400. For these aircraft the high seating densities and load factors of typical low cost operators were used, i.e. 80 percent.

7.2.2 Data collection

The selected routes had been investigated by the CAA in 1997 and therefore data for more recent years had to be found. This was accomplished via the European Commission's New Cronos database, which provides data collected by national authorities across the EU's member countries. The data collected comprise a variety of themes one of which is Transport. The Aviation domain within the Transport theme includes data series on more specifically, the top 40 routes worldwide and EU-wide for each of the ICP airports in the Trans-European Airport Network (but any route with less than 400 passengers has

been excluded). Also a variety of rankings of the top 50 airports within the EU and Switzerland according to international origin / destination passengers carried are amongst others.

The ICP (International Connecting Points) represent the top tier of airports in the Trans-European Airport Network. Data appearing in these tables is origin/destination data reported by each individual airport to/from second airports. This is true for all reporting airports except for Lyon and Paris where data reported relates to the airport systems: Paris (Charles de Gaulle, Orly, Le Bourget airports), Lyon (Bron, Satolas airports). In many cases for a town with more than one airport, the "second airport" actually refers to the airport system rather than a single airport. Note that in cases where the reporting airport provides information for all individual airports in a given town, not all routes concerning a given town may appear in the top 40 routes so that the top 40 may understate the town total. In these cases (e.g. Milan) all the individual airport data were added to provide a truer picture of the total traffic from the city area.

No information was available for the ICP airports of Copenhagen-Kastrup, Copenhagen-Roskilde, Helsinki-Vantaa, Luxembourg, and Stockholm-Arlanda as the relevant reporting countries were unable to provide origin/destination information.

These are tabulated so as to give individual traffic data per city pair within the EU market for the years from 1993 to 1999. In some years city pairs quoted were for the complete airport system of multiple airport cities like London, Paris, Milan, Rome and others. As the aim was to provide the data for city pairs then where available the airport system totals were used. If those were not

available then traffic from the individual airports was added to provide a total for the whole city airport system.

Initially, the CAA's data for 1997 were checked and corrected as required, because some of them were projections based on an average growth rate from 1995 data. Once the full set of traffic data were applied for 1997 to 1999 it was necessary to enter those for 2000. As there were no data collected by the New Cronos database for 2000, projections based on passenger growth were aimed for. Annual growth figures for each country were taken from the AEA collected statistics of successive years, which were those measured amongst the AEA members for their scheduled services. As individual countries had different growth rates then a compound growth rate was used, being the sum of the rates from the two countries whose cities formed the two ends of the route. In this manner traffic data for the intra European routes were fully completed.

7.2.2.1 Domestic route data collection

Problems were encountered with the traffic data for domestic routes. The New Cronos database does not contain specifically domestic traffic data from the member countries but only for intra European. The ICAO Traffic by Flight Stage Report (1999) was consulted, but again there were no domestic traffic data to be found, as these were not being reported. This created a considerable barrier to furthering this research as preliminary inspection of these routes indicated fertile ground for a low cost carrier. Furthermore, experience has shown that domestic routes, particularly in Europe tend to be monopolistic and dominated by one incumbent, usually the national carrier through a variety of

ways. Therefore it was imperative to find a way to estimate the amount of traffic carried on these routes.

Due to the limits of publicly available traffic data for these routes a method of approximating the traffic was devised. A survey was carried out to find the number of daily frequencies flown by all the operators of each route from 1997 to 2000 for the month of November of each year. In this manner the data already published by the CAA were checked and updated while at the same time a picture was obtained of the route developments since 1997. Frequencies of individual carriers were noted, and tabulated giving a total of the daily frequencies flown. Additionally, the number of carriers competing on each route were gathered, together with the aircraft types flown.

In the survey any flights occurring less than three times a week were not counted. Furthermore in cases when flights were operated by a franchise or subsidiary carrier under a code-share, as well as by the parent airline were counted under the main carrier. Any 5th freedom flights were also disallowed if they fell below the three times per week rule as they can only offer limited capacity.

The number of frequencies were converted to passengers by approximating the number of passengers carried in each aircraft by knowing the aircraft type used, the seat load factor and the seating density in the cabin. Data on seating densities were taken from individual airlines' timetables according to aircraft type. A nominal seating density was obtained as 'average seats per aircraft' for each type in this way and this was applied for all carriers using the same type. Throughout these domestic routes the aircraft sizes varied widely from the

Airbus A300-600 to the Canadair Regional Jet and the DeHavilland Canada DHC 8-400.

Seat load factors were used for the domestic operations of AEA member airlines from the AEA statistical appendices collected for the corresponding years. Having applied them instead of a more generic system-wide load factor provides a better picture. This is because the domestic market has historically been a higher load factor market when compared to the European network operations. It also adds a much needed margin of accuracy in what is an otherwise approximate exercise in deducing the correct number of passengers brought about by the lack of published data. Finally, the distance of the route and the block time allocated by the airlines were collected from the OAG guide.

7.2.2.2 *Leisure and charter routes*

In recent years the low cost carriers operating in Ireland, the UK and Europe have begun to enter routes that would otherwise be the sole domain of the established charter tour operator airlines. These routes tend to be to either summer or wintertime resorts such as Treviso, Brescia, Perpignan, St. Etienne and in the past have been served by the package holiday sector during both summer and winter seasons as appropriate.

It is expected that this practice will continue in the near future, particularly if trends in taking shorter and more frequent holiday breaks continue. One other area which could increase this trend is if consumers decide to create their own combinations of flights and holiday accommodation rather than buy an all in package holiday. For this reason it is envisaged that the low cost operators

would start challenging the charter carriers on the more dense charter routes they operate. From the New Cronos database several city pair routes included in the top 40 destinations from a variety of northern European airports conformed to this pattern. It was thus prudent that, since the data existed, a more serious investigation should be undertaken to examine the extent of the suitability of such routes to the low cost carrier mode of operation.

A further survey was carried out containing a group of routes conforming to the leisure or charter type destination. This was achieved by including those city pairs containing destinations in the traditional European holiday resorts in the Mediterranean or the Canary Islands suitable either for the long summer vacation or for shorter secondary vacations.

Having selected the appropriate city pairs then traffic data for between 1997 and 1999 were tabulated and those for 2000 were calculated as described in section 8.2.2 above.

As explained earlier until now the frequencies for each competitor on a specific route were counted on a daily basis with a cut off point of not less than 3 times a week to block very small scale operations. For this set of data however there were a number of routes operated by charter airlines on a scheduled basis, as contained in the OAG Flight Guides. However, the frequencies were very low since most of these flights occurred on selected days around the weekend and did not amount to a full daily schedule. This conflicted with the intentions of a low cost operator to enter any new route with at least a daily service. In order to maintain an accurate comparison it was decided to count individual flights and express them as a ratio of a weekly service by dividing them by the

number of days in the week. In establishing the number of competitors in these routes only those for which schedule data were available were counted.

A further idiosyncrasy of the charter sector encountered was the lack of schedule information. This is quite natural, as there are no schedules published for purely charter flights, but remain internal to the charter carrier and are adjusted according to demand. In some cases in the past charter flights were 'adjusted' or consolidated even a few hours before departure, so as to fill aircraft to the maximum extent possible. Because of this it was not feasible to establish the number of frequencies flown during the week. Another set of routes falling in the similar category were those for which only connecting schedule traffic was available instead of the required direct flights. In the tabulation the former, purely charter flights were marked as 'No Schedule Service', (NSS) and the latter as 'No Direct Service', (NDS).

To overcome the problems with both these types of route, 'probable' frequencies were approximated based on averages of frequencies taken from routes, which had similar traffic densities. This method sought to capture the effect of the charter airlines serving destinations with enough traffic density in a similar manner to that of scheduled airlines. The shortcomings of this philosophy however are that in real life charter airlines do not select their destination frequencies in this manner but depend on the attractiveness and the tourist development of individual resorts which are served by their parent tour operator.

All city pair routes were analysed as before and were subjected to projections of expected market share under the S – curve assumption. Additional

projections established the number of passengers after new entry as well as the number of passengers per aircraft after new entry as with all the other types of routes.

7.3 RESULTS OBTAINED

The results were grouped into the following categories according to the tabulations made:

- i. Existing routes from Heathrow with potential for new entry.
- ii. Most likely routes between European hubs to have had new entry from 1997.
- iii. Other similar monopoly or duopoly routes at European hubs to primary or secondary European cities using the CAP 654 criteria for entry.
- iv. Leisure or charter routes
- v. Domestic routes

The findings within the individual groups provided variable information on how widespread is the potential for entry by a low cost carrier and on the critical factors affecting this potential. In order to provide a way to assess the suitability and identify the type of each route examined a set of criteria were applied. The initial suitability criteria set were:

TYPE 1:

- Passengers per aircraft higher than 65 per flight.
- Annual passenger market share higher than 15 percent attained after new entry, as calculated under the S-curve assumption.

In addition to this set of criteria for compatible routes a further 3 were added to identify the characteristics of the other routes, which were not suitable, and to display the reasons why it was so. These further criteria were:

TYPE 2:

- Passengers per aircraft lower than 65 per flight.
- Annual passenger market share higher than 15 percent attained after new entry, as calculated under the S-curve assumption.

TYPE 3:

- Passengers per aircraft higher than 65 per flight.
- Annual passenger market share lower than 15 percent attained after new entry, as calculated under the S-curve assumption.

TYPE 4

- Passengers per aircraft lower than 65 per flight.
- Annual passenger market share lower than 15 percent attained after new entry, as calculated under the S-curve assumption.

7.3.1 Type 2 routes

They are the typical case where the required market share is achieved at a lower load factor. This means that if a new entrant starts operating in addition to the existing carriers, it will not be able to attract enough passengers to achieve a satisfactory load factor. A characteristic of these routes is that the incumbents serving them do so at fairly high frequencies themselves. Since routes of this type tend to be short haul, mostly less than 1000km distance, if a new entrant dedicated a single aircraft it would be able to achieve a high number of daily rotations. This seems to work against the new entrant as more frequencies are added to what are routes already served with high frequencies by the incumbents. Generally, the frequencies possible with a single aircraft operation vary from a minimum of 2 to a maximum of 12 per day.

In some of the routes it is possible for a new entrant to start operations provided that it restricts itself to a lower frequency schedule in order to maintain adequate load factors. Naturally, this will only hold true provided that there are no other changes in the incumbent's scheduling and the effect of lower fares of the low cost carrier applied to these routes is discounted. All these routes are flagged as 'Low density' to indicate this characteristic.

7.3.2 Type 3 routes

They were flagged as 'Higher Seats' as a result of a low market share, which nonetheless exhibited adequate levels of passengers per flight. In some cases they were of a higher seating level than some of those that were accepted as compatible. These types of routes could be considered as certainly dense enough for a low cost carrier although ones where a single aircraft solely operating would not be sufficient to achieve the necessary market share. It must be noted that the number of entry frequencies possible at new entry are a function of the sector distance and only a single aircraft would be earmarked for the route. This however should not automatically disqualify them from consideration since achieving the required market share would simply necessitate a more intensive operation. Routes of this type indicate that both the seat density and the market share will not be achieved at the current conditions.

7.3.3 Type 4 routes

The remaining routes flagged 'Low seats and share' presented a combination of low seating and market shares. Although they were small in number (6) they

indicate that in the way these routes were being serviced currently there was not enough scope for a low cost carrier to enter. Usually these routes exhibited a very strong duopoly under which the two incumbents were operating sufficient rotations for the traffic available to allay the potential of new entry. In one of them an independent new entrant had started operations since 1997 which caused the two incumbents to raise their frequencies since that time. Two of these routes were domestic city pairs, and one was a charter pair.

From the overall route projections a total of 126 city pair routes were obtained as compatible and they will be described below, according to the group they belonged. These have all been tabulated in the spreadsheet file **Schedules.xls**.

7.3.4 Heathrow Duopoly Routes – Group (i)

All of Heathrow's routes examined were to another main hub of an incumbent airline or one of its secondary hubs such as Barcelona, Düsseldorf, Nice or Munich.

A total of 10 Heathrow based routes were obtained as suitable. Within these only one had a minimum of 2 daily 737-300 (148 seats) service. The others had enough capacity to allow up to a maximum of six daily flights, the highest number being to Gothenburg which currently is a monopoly route. All the routes examined had enough capacity to allow a bigger aircraft size such as the 737-400 (168 seats) to be operated on at least a twice daily frequency. In some cases routes were dense enough to accept the larger aircraft without even lowering the daily frequencies of the smaller 737-300 type.

Passengers per aircraft after new entry varied from a minimum of 70 for Düsseldorf to a maximum of 135 for Lisbon. The corresponding figures for market shares were a low of 15.4 percent for the route to Copenhagen and the highest were 100 percent for Gothenburg. In terms of 737-300 frequencies the top pair was Gothenburg with six and the lowest was Vienna with two.

7.3.5 European Hub Duopoly routes - Group (ii)

Routes 16-30 examined in this group were again either between main hubs of incumbent airlines or one of its secondary hubs such as Barcelona. Route distances varied from a short 365 km for Frankfurt - Amsterdam to 2,101 km for Paris - Athens. The passenger traffic for 2000 varied between 512,618 to 1,257,181 passengers.

This group produced four Compatible, six Low Density, four Higher Seats and one Low Seat and Share routes. From the total of 4 routes obtained as suitable only one had a minimum of 2 daily 737-300 service whereas the others had enough capacity to allow up to a maximum of five daily flights, the highest number being Paris – Amsterdam All the routes examined here again had enough capacity to allow a bigger aircraft size such as the 737-400 (168 seats) to be operated without lowering the daily frequencies of the smaller 737-300 type. The exception to this was the Paris – Amsterdam route which suffered a reduction of one daily frequency.

Passengers per aircraft after new entry varied from a minimum of 67 for Paris - Amsterdam to a maximum of 76 for Amsterdam – Madrid. The corresponding figures for market shares attainable were a low of 16.67 percent for the route to

Amsterdam – Madrid and the highest were 21.87 percent for Paris – Amsterdam.

In this group all but six routes were duopolies between the incumbent carriers and there was one monopoly between Stockholm and Copenhagen. All of the routes identified as compatible were for previous duopolies. The monopoly route was flagged as Type 2 low-density route suggesting that the 19 daily frequencies the incumbent was operating were sufficiently intensive.

7.3.6 Other European Duopoly Routes – Group (iii)

Routes 31-75 examined were either between the main hub of incumbent airlines or between main and secondary hubs or large cities. Typical examples of these latter routes were Madrid – Hamburg, Amsterdam - Birmingham, Milan – Barcelona, or Madrid – Bologna. This group contains 10 monopoly, 28 duopoly routes and 6 routes with 3 competitors.

A total of only 4 routes were obtained as suitable. The great majority were flagged as Type 2 routes and just two and one as Type 3 and 4 respectively. From within the compatible routes the passengers per aircraft after new entry varied from a minimum of 67 for Madrid - Bologna to a maximum of 109 for Paris - Lisbon. The passenger market share varied from a low of 16.67 percent for both Amsterdam - Barcelona and Paris - Lisbon to a maximum of 100 percent for Madrid – Bologna. As with the case of Heathrow – Gothenburg earlier, so too Madrid – Bologna indicates that the incumbent's 3 daily frequencies were undeserving the available passenger density. This further suggests that since either the new entrant will quickly dominate, if it enters

with a single dedicated aircraft on the route or it could simply match the incumbent and obtain a higher load factor.

Within these, a minimum of 2 daily 737-300 service for Amsterdam – Barcelona and a maximum of 8 for Madrid – Bologna. A bigger aircraft size was also possible without frequency changes for 2 of the four compatible routes.

The large number of routes flagged as Type 2 suggested that the existing number of frequencies operated by the incumbents were depressing the average load factor. As noted earlier, particularly for the shorter distance city pairs, the possibility of the new entrant dedicating a single aircraft to ply the route simply works against his interests as it floods the market with extra frequencies.

It is matter of debate if the new entrant wishes to assume such an aggressive market entry from the outset or to seek a more compromising tactic knowing that its lower costs will put him in a stronger position versus the other incumbents.

7.3.7 Leisure / Charter Routes – Group (iv)

Routes 76-334 examined fell in one of two categories: a) between a main hub and a either for summer time or winter time holiday destination, and b) between a main city or hub and a secondary city in Europe which could carry a mix of leisure and holiday traffic. Leisure traffic is defined under the short break or the ‘Visiting Friends and Relatives’ categories.

In the selection of routes in case (a) above the main criterion was for traffic between northern, western or central European cities to holiday resorts in the

Mediterranean or the Canaries and Madeira. Consequently a lot of these routes involved predominantly charter airlines flying a mix of scheduled and charter flights.

Category (b) is less biased towards these charter destinations and includes cities with traditionally strong tourist traffic.

This group contained 91 monopoly and 69 duopoly routes, 22 routes with 3 competitors, 24 routes with 4 competitors and 6 routes with 5 competitors.

A total of 102 routes were obtained as suitable, 153 were Type 2 and 2 each were Type 3 and 4. The group is characterised by large passengers per aircraft levels and consequently by large daily frequencies possible using the two types of aircraft available to the low cost operator. In general for all the groups, and more specifically in this leisure / charter group such high values, are indicative of the lack of scheduled services available to these destinations. It is misleading therefore to assume that in the case of Brussels – Alicante, for example, just fewer than 290,000 passengers a year were dependent on a single weekly frequency. Hence according to this model, if the new entrant started operating on this route then it would effectively be a monopolist, carrying almost the total of the traffic. In reality a charter airline such as Sobelair would still attract a sizeable proportion of the total traffic, which given its end point will be subject to considerable seasonal variations.

What this table tries to show is that some operators consider these routes to offer enough potential to operate a sometimes small number of scheduled frequencies as well as the normal charter services. A good example of this is route no. 248, Palma – Manchester. Operated by Air 2000, the UK's second

largest charter carrier, once a week although Air 2000 flies several charter flights to Palma from Manchester and other UK points through the summer holiday season.

From within the compatible routes the highest passengers per aircraft after new entry were 423 for Palma – Manchester and the minimum were 65 for Vienna – Frankfurt. The passenger market share varied from a low of 18.75 percent for both Brussels-Rome and Vienna-Frankfurt to a maximum of 1400 percent for Brussels-Alicante.

In general, the routes belonging to category (a) above hold more potential for a new entrant who could serve them adequately given its lower cost base.

7.3.8 Domestic Routes – Group (v)

Routes 335-381 examined were either between one of the country's main airports or hubs and another city or a secondary hub in a regional capital. The secondary city varied from cities like Hamburg and Lyon to smaller ones like Rhodes, Perpignan, Cagliari or Helsingborg. Typical examples of these latter routes were Madrid – Hamburg, Amsterdam - Birmingham, Milan – Barcelona, or Madrid – Bologna. This group contains 24 monopoly, 14 duopoly routes and 8 routes with 3 competitors.

No routes were found to be suitable. The great majority (44) were flagged as Type 2 routes and just two as Type 4. The passengers per aircraft after new entry varied from a minimum of 9 for Marseilles - Biarritz to a maximum of 45 for Heathrow - Newcastle. The passenger market share varied from a low of 13 percent for Paris - Montpellier to a maximum of 100 percent for Marseilles -

Biarritz. Within the whole group, daily frequencies possible with a 737-300 varied from one to five and with a 737-400 from one to four.

As noted earlier, the large number of routes flagged as Type 2 suggested that the existing number of frequencies operated by the incumbents were depressing the average load factor. One characteristic of these domestic operations, and particularly with reference to the shorter distance city pairs, where all are below 900 km and most are between 350 km and 700 km it is apparent that the airlines devote disproportionate frequencies of routes to what are mostly thin densities as confirmed by the figures for passengers per aircraft above. This could be explained as a defensive mechanism against new entry into what they considered their rightful territory.

8 PROJECTING LCC FUTURE GROWTH

8.1 *INTRODUCTION*

Since 1991 the year of Ryanair's re-incarnation as a low-cost, no-frills carrier there have been another five carriers of the same philosophy inaugurating scheduled services within Europe. All, except Virgin Express have been based in the UK. Everybody familiar with Southwest's illustrious growth in traffic and profits, expecting these airlines to perform just as well, might have been surprised from the failure of Debonair, one of the original UK low cost carriers which failed only after three years of operations and two years after a successful stock market floatation. [Doganis (2001)].

Although, the reasons for the demise of Debonair is not part of this research, Doganis notes that during the last two years of its operations Debonair was steadily moving away from the core model of the low cost, no-frill operation to the extent that just before its collapse it had become a 'low cost full-frills' airline. This combined with the intense competition encountered after the establishment of BA's GO at Stansted and Ryanair's European route expansion also from Stansted meant that the airline entered a downward spiral from which it did not emerge.

If Debonair's fate was due to management errors would the future of all the other airlines be secure provided they followed closely the original Southwest philosophy? Naturally, although within the airline industry there is no security,

what needs to be investigated is whether the market conditions are likely to favour these airlines.

It is proposed to do that by examining various forecasts for the short and medium term and try to correlate these factors with problems that might arise as a direct consequence of factors external or internal to the airline's operation.

8.2 SHORT TO MEDIUM TERM FORECAST.

As mentioned above four of the five early European low cost carriers have been based in the UK. The future growth of the markets they serve will be investigated using the Department of the Environment, Transport and the Regions Air Traffic Forecast for 2000 [DETR (2000)] (the DETR has since been renamed to Department of Transport, Local Government and the Regions, DTLR).

The key variables used in determining air traffic were domestic and foreign economic growth (principally GDP); airfares; trade and exchange rates. This is consistent with the results of other research conducted over many years by the former Department of Transport (DOT) and others into air passenger demand and is also what would be expected from economic theory. Forecasts are given for five yearly intervals from 2000 to 2020. The total forecast is built up from individual forecasts of 16 international market segments and 3 domestic markets

The forecasters recognise that high demand growth in air travel is now largely historical for the developed countries of Western Europe, because the market in air travel has been maturing for some time already. Although there is variation

in the maturity stages of individual market segments within the overall market, there are significant signs that the declining income elasticities, which accompany market maturity, implies are becoming increasingly prevalent. It is also possible that part of the attraction of low cost carriers is precisely the fact that in their low cost philosophy are addressing this change in air travel consumption. Looking at past forecasts of average annual growth rates of terminal passengers at UK airports have generally been declining over time as the market moves toward maturity, falling from 12 percent in the early 1960s, to just over 5 percent between 1990 and 1998. The mid point forecast of an average of 4.3 percent over the next 20 years continues the long term trend of a gradual reduction in growth rates.

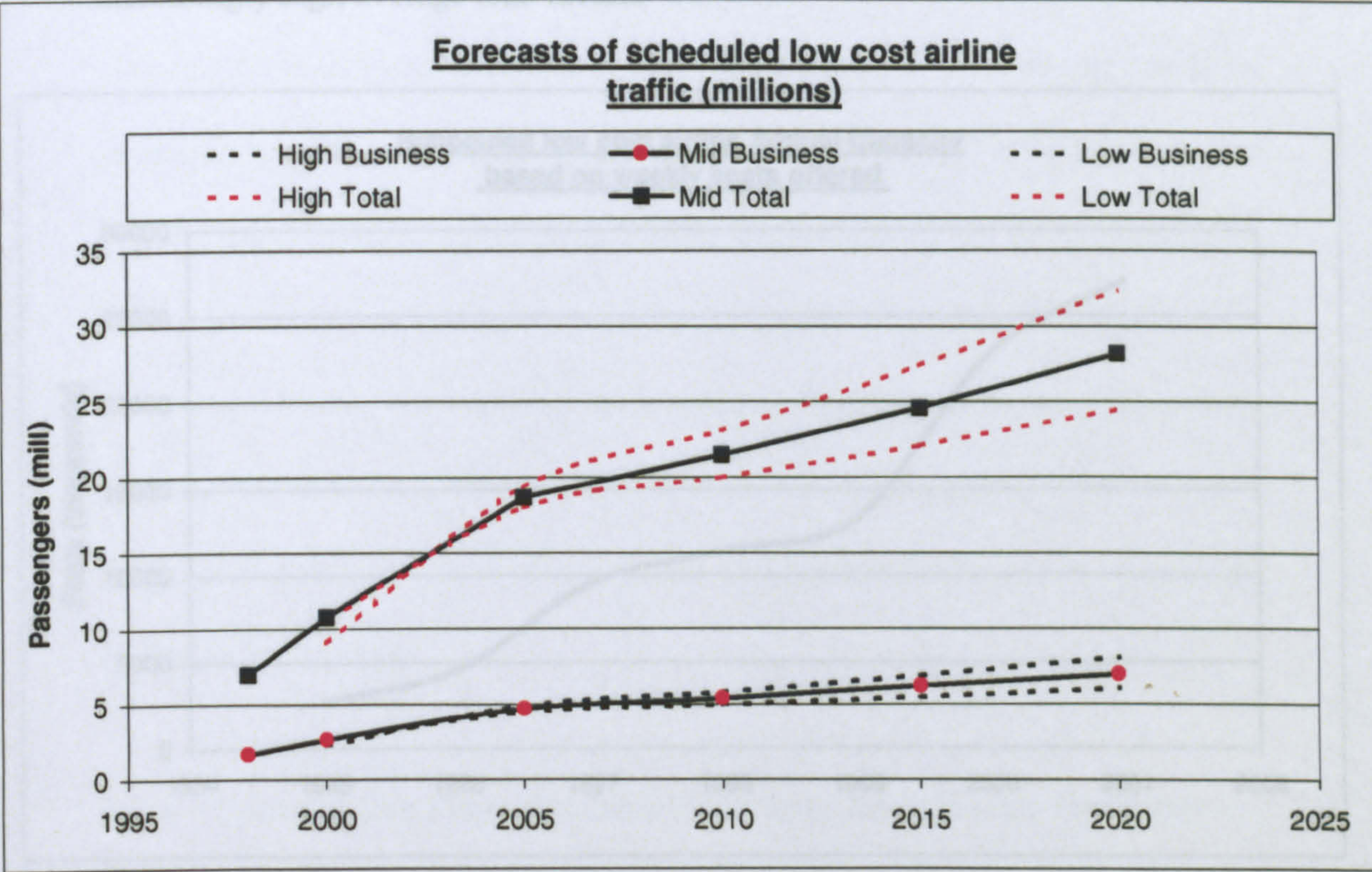
However the above rates because they include the large growth being generated by the scheduled low cost carriers it is actually masking the static effect of the rest of the industry performing more conservatively.

Year	Including L.C.C.	Excluding L.C.C.
1960-69	14.00	14.00
1970-79	7.30	7.30
1980-89	5.70	5.70
1990-99	5.10	5.00
2000-10		4.30
2010-20	4.30	3.80

Source: CAA UK Forecasts 2000

Table 8.1: Trends in Average Annual Growth Rates 1960 to 2020

Table 8.1 shows this effect if the SLC airlines are taken away. For the second decade of the forecasts, 2010-2020, trend growth is assumed to fall to 3.8 percent, slightly less than the 0.7 percentage point decline in the previous decade, reflecting that the rate of decline is expected to slow. From this in the first and second decades of the century it can be established that the forecasted growth rate of the low scheduled airlines can account for up to quarter of a percentage point of the whole UK market.



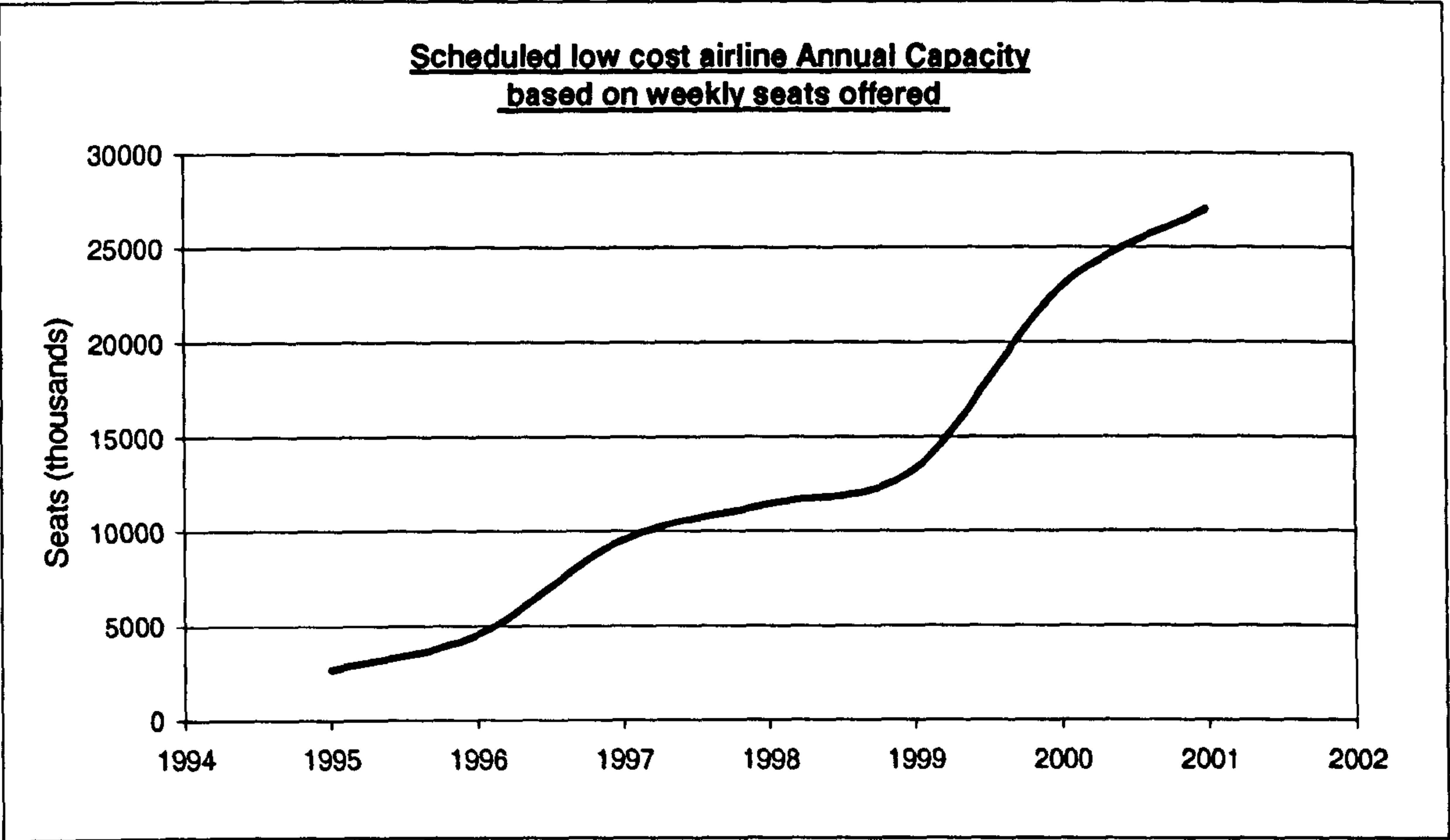
Source: CAA UK Forecasts 2000

Fig. 8.1: Forecasts of scheduled low cost airline traffic

In Fig. 8.1 the growth in SLC is shown in terms of both total and business passengers. Throughout the first two decades growth average growth reaches 6.6 percent per annum central scenario, however the average is raised to this high value by the large growth rates calculated for the years to 2005, which

average 15 percent per annum. Growth in this period is due to the introduction of new routes, and thereafter for the years between 2005 to 2020 due to more passengers using the existing network.

The fast growth of the SLC can also be verified from data gathered by the AEA where the number of weekly seats offered in the summer seasons of a series of years is shown in the figure below. Although the capacity growth is very rapid these airlines have been able to fill up their aircraft as testified by their increasingly high average load factors



Source: AEA 2001

Fig. 8.2: Scheduled Low Cost airline Capacity 1995-01

The shape of the graph in the above figure shows clearly the changes of the rate of adding capacity. This effect is two fold: firstly it depends on the expansion plans of the existing carriers which have a continuous rate of introducing new aircraft in their network and secondly, the capacity added by

the new airlines starting operations. In 1995 there were only Ryanair and Virgin Express, operating, the latter in its original guise of Euro-Belgian Airlines. By the summer of 1996, easyJet closely followed by Debonair joined the market with four aircraft each (148 seats and 103 seats respectively) while Ryanair had begun to grow. The years between 1997 and mid 1999, showed a slowing down of the pace and some consolidation was taking place. Then in May 1999 GO started operations again with four 148-seater aircraft. Between that time and the present, 'buzz' has also started in early 2000 while Debonair ceased operations just before that. The rate of growth of capacity has been rapid since mid 1999 because both Ryanair, easyJet and GO, to a smaller extent, have quickly moved to establish themselves in an almost defensive tactic. It will be interesting to see to what extent this expansion rate can be sustained, although it would be more realistic to expect it to abate. Recently, Ryanair has announced the opening of a new hub at Brussels Charleroi airport, where it is going to base 4 of its aircraft and operate 7 new routes to existing points on its network.

8.2.1 Contribution From Established Airlines And Charter Operators

It is interesting to note that in the DETR's forecast methodology it is considered that the minimum number of passengers allowing a feasible SLC operation is 70,000 per annum, whereby 70 percent of which was new traffic generated and 30 percent was traffic diverted from existing incumbents. This places all routes with traffic levels of at least 100,000 per annum within the scope of entry by an SLC. This fact combined with the statement that SLC's

nature is to enter only routes already operated by existing airlines should cause some concerns with incumbents. Clearly SLC are aiming to exploit their lower costs by attacking the markets of the incumbents. Despite this not all airlines have closely followed this strategy. Current experience with Ryanair shows that there are several airports in Europe without existing service by incumbents, which can become successful SLC destinations of their own. Ryanair has gone to great lengths to associate these airports with the nearest traditional destination, even to the extent of applying to IATA to re-designate them using the main city's name. In most of these cases these airports have individual catchment areas in addition to those of the nearby traditional hub.

Passengers diverted from Mainline carriers (mill)				SLC PASSENGERS		
Year	Business	Leisure	Total	Business	Leisure	Total
1998	0.51	1.56	2.10	1.70	5.20	7.00
2000	0.81	2.43	3.24	2.70	8.10	10.80
2005	1.41	4.20	5.61	4.70	14.00	18.70
2010	1.62	4.83	6.45	5.40	16.10	21.50
2015	1.86	5.55	7.38	6.20	18.50	24.60
2020	2.10	6.33	8.46	7.00	21.10	28.20

Source : Compiled from DETR UK Forecast 2000

Table 8.2: The effect of SLCs on incumbent airlines for UK market.

Given this analysis, it can be quickly calculated that the following numbers of passengers will have been diverted from the mainline carriers during the time periods shown in table 8.2.

One of the problems this poses for the mainline carriers is that in recent years there has been a stagnant business travel sector and the main growth has occurred in the low yielding economy segment. What this analysis displays is

that the established carriers are not only going to haemorrhage some of their economy passengers but up to 20 percent of the losses will be at the more important business traffic.

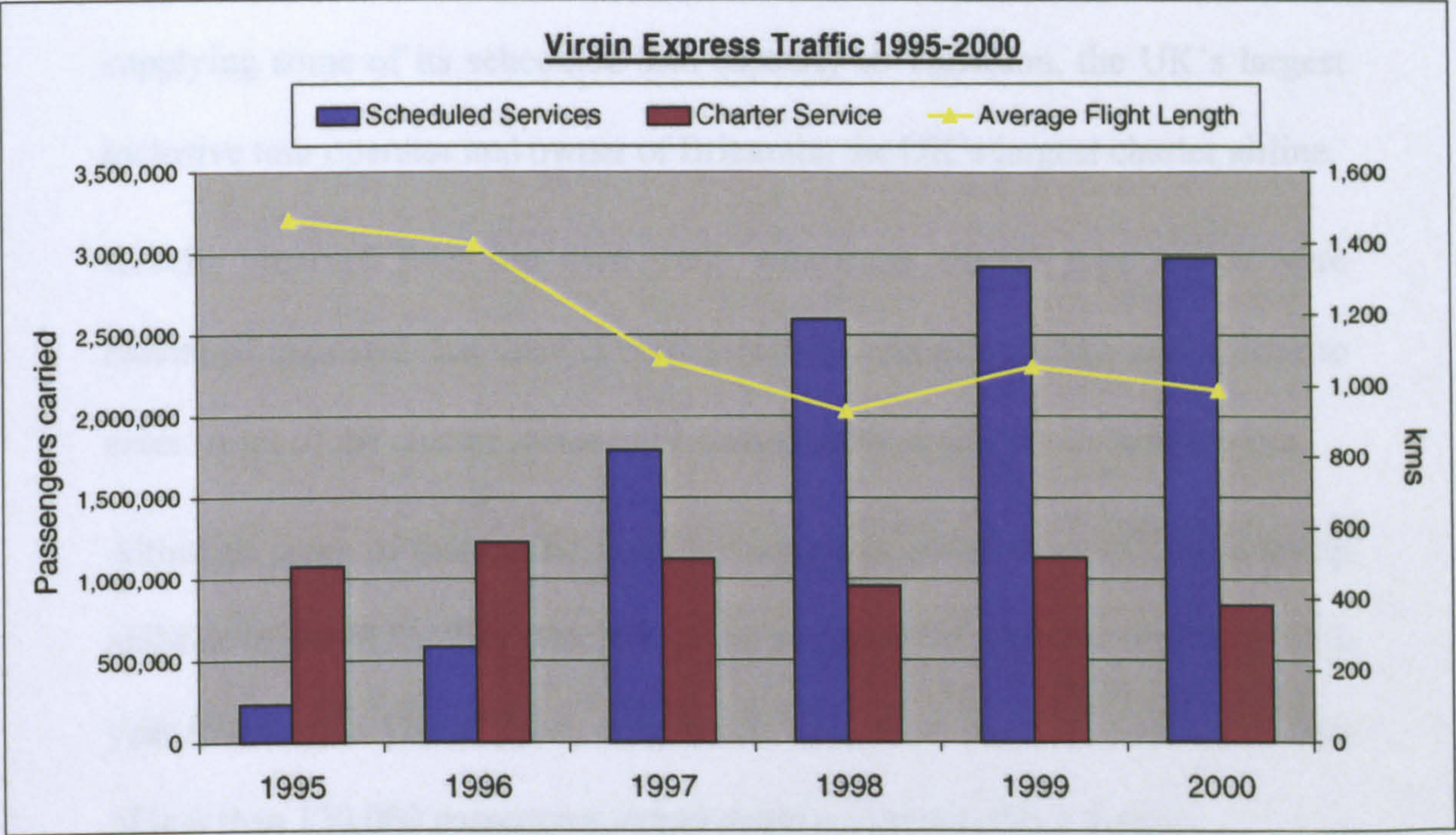
As already explained earlier the low cost airlines are beginning to successfully market their flights to the more price sensitive business passengers who are increasingly getting a taste of this alternative form of travel.

8.2.2 Contribution from Charter Operators

As described earlier the low cost airline in their efforts to find new routes which are not heavily operated by the mainline carriers have entered some of the traditional charter routes, usually flown by the inclusive tour operator airlines. In some cases these airlines combine scheduled with charter operations as is the case of Virgin Express. Virgin Express based in Brussels National airport previously known as Euro-Belgian Airlines (EBA was established in 1992). Since 1996 when it was taken over by the Virgin Group and renamed Virgin Express it has focused on the low cost scheduled sector. Nonetheless until today it has maintained a considerable number of charter destinations. Although as can be seen from the figure below since 1997 the charter share of its activities has been declining it still managed to carry around a million passengers.

This occurrence is not restricted to the Virgin Express. In other countries with the same degree of charter industry development like Germany and Italy there are several major airlines that fly a combination of charter and Scheduled routes. Airlines like Condor, LTU, Hapag Lloyd and Aero Lloyd have a

considerable charter route portfolio but several of these routes are flown on a published weekend scheduled all year round.



Source: Virgin Express 2001

Fig. 8.3: Virgin Express traffic breakdown

In fact LTU has recently forged close links with scheduled mainline carriers by becoming a member of Swissair's Charter Airline Alliance. In other airlines like Spanair Air Europa and Air Europe S.p.A of Spain fly a mix of charters to the Canary and Balearic Islands or even to long haul destinations as well as operating scheduled domestic routes [Mason Whelan and Williams (2000)].

Competition between charters and scheduled low cost carriers has not appeared to become very prevalent yet, perhaps due to the fact that the two market segments are still separable. Alternatively it could be hypothesised that there is enough traffic available to keep the two segments separate and until now the only blurring has been occurring at the periphery of each market. It is possible

that if a downturn affects the leisure industry then the SLC airlines will have to look harder at possibilities offered by the charter market. For the time being there is even some co-operation between the two as signified by GO's supplying some of its scheduled seat capacity to Thomson, the UK's largest inclusive tour operator and owner of Britannia, the UK's largest charter airline.

Results obtained from our own study where the charter type routes were examined indicated that there is considerable potential for a low cost carrier to enter. A lot of the charter routes have considerable traffic on an annual basis.

Although some of that traffic is highly seasonal, given the traffic generating abilities of the SLCs they should become compatible routes for operation on a year round basis. Out of these, only routes with an annual SLC passenger share of less than 120,000 passengers would retain a summer only schedule.

Looking at the purely charter routes it was found that a median of 220,779 passengers per annum were attainable translating into a median of 75 percent market share under the scheduled mode. These numbers are very encouraging and in some cases are superior to the traffic share at the start up period of some of the existing routes.

8.3 SENSITIVITY ANALYSIS AND ELASTICITY DATA FROM FORECAST

Economic literature and textbooks are awash with definitions of elasticity and the descriptions of various types of elasticities. In general elasticity describes the relationship of a resource to an external factor whose property is not fixed but varies according to external conditions. With reference to air travel when elasticities are mentioned what is meant is either income elasticity or price elasticity, both of these refer to the demand for air travel.

This type of relationship was firstly developed when it became apparent that as people's incomes grew then they were more likely to travel by air either for the first time or for repeat journeys. Therefore the definition of income elasticity of demand is the ratio between the percentage change in demand to the percentage change in income usually expressed as an integer number. With the same reasoning it follows that price elasticity of demand is the ratio between the percentage change in demand and the percentage change in price or fare. [Doganis (1985)].

Both types of elasticities have become useful tools in predicting changes in the behaviour of consumers and for finding the reasons behind these changes. Elasticities are changeable and will be useful only if their information is recent. In order to do that however it is important to have accurate elasticity. As the air travel market becomes more fragmented, so do the elasticities for the individual market segments.

In order to achieve adequate accuracy multiple regression techniques are used in order to isolate the impact of all the other variables from the required quantity. Advanced methodological procedures and recent data on various economic aspects are required to produce accurate results. Without entering into a long debate about the intricacies of obtaining price and income elasticities of demand we shall accept the reliability of and refer to those published periodically by the CAA or BAA or in this case the DETR's aviation forecasting unit.

Chapter 7 of the UK Forecast for 2000 provides a breakdown of the method used to obtain the appropriate elasticities affecting air travel in the UK. Elasticities for the following variables were defined:

8.3.1 Reduction in medium term GDP growth trend.

Using the Treasury's economic forecasts for the long term average growth rate between 1998 and 2020, falling from 2.25 percent per annum to 1.75 percent per annum produced an income elasticity of +1.5.

8.3.2 Market maturity

Market maturity affects air travel adversely. As the market matures there is less preponderance of consumers to travel because, in a way, there is reduced novelty in the idea of air travel. Provided all other variables stay the same a maturing market will cause a reduction in the growth of air travel. This however has to be matched to each particular market segment which might have considerable differences between them. Such is the case between business and the leisure markets. Hence 2 different elasticities were calculated, one of +1 and the other for +2. It is the latter that better fits the fast growing SLC market.

8.3.3 Application of aviation fuel tax

A government tax that is being considered for the middle of this decade aimed at making airlines more sensitive to environmental issues with respect to the

burning of fossil fuels and to the aircraft emissions. The tax will start at 10 percent of fuel costs and will be gradually increased up to 100 percent. Being an industry wide tax it has uniformity, which will protect the existing fuel differentials and is predicted to raise costs by 1 percent per annum. Elasticity value: -1.0. No special effects are expected for the SLC airlines although most of them are already operating newer recently purchased aircraft and have large orders for brand new fleets.

8.3.4 Increases – decreases in fares growth

The forecast assumption of the historical trend of a 2 percent reduction in fares per annum has been adjusted to 1 percent per annum to reflect the new structure in traffic types of the current marketplace. Due to this, one sensitivity test assumed a 1 percentage increase per annum, giving a constant fare and the other test a reduction of 1 percent per annum giving an overall reduction of 2 percent per annum. The elasticity value used was: +1.0

The former assumption does not fit well with the historic reduction of fares in real terms. Although this reduction cannot continue indefinitely, the effect of the very low fares offered by the SLC airlines will maintain a considerable downward pressure on this variable. Hence, the 2 percent reduction per annum is more appropriate although in the initial period to 2005-10, it could be even lower.

8.3.5 Airport charges

Airport charges representing a bigger share of airline costs up to nearly 20 percent, particularly for intra European and short haul carriers any large increases from the main airport operators, would have a detrimental effect of the carriers costs and the fares passengers pay. Because the SLC airlines have avoided large, congested and expensive airports and have negotiated very attractive deals with the airports they serve, as well with their own home airport, they will be considerably shielded by this effect. Applying a price elasticity of -1.0 reduces demand by 7.5 percent per annum, a high figure for a SLC. A rough estimate would put this figure closer to 3 percent per annum. Naturally, it is a matter of debate however as to the resilience of these airlines in fighting the pressures of increased airport charges as they mature and move away from their initial niche markets. All the price elasticities of demand calculated above have been applied to the forecast for traffic growth of the scheduled low cost airlines and the corresponding traffic figures derived are shown in table 8.3 at 2010 and 2020 year marks.

Sensitivity Test	Mid-point traffic forecast		Percentage change (%)
	in 2010 (million)	in 2020 (million)	relative to central scenario
<i>Central Scenario</i>	21.50	28.20	–
Lower medium term GDP growth	17.85	23.41	-17.00
Greater market maturity 1.0 income elasticity	18.92	24.82	-12.00
Lesser market maturity 2.0 income elasticity	24.08	31.58	12.00
Environmental fuel tax	19.35	25.38	-10.00
A 1pp increase in fares growth p.a.(0%)	16.13	21.15	-25.00
A 1pp decrease in fares growth p.a. (– 2%)	25.80	33.84	20.00
Increase in airport charges	20.86	27.35	-3.00

Source: Compiled from DETR UK Traffic Forecast 2000

Table 8.3: Results of sensitivity tests for Scheduled Low Cost carriers

8.4 FACTORS AFFECTING LCC'S GROWTH TRENDS

Looking to the future one asks what would be the factors that could slow down the rapid growth in the Low cost carrier's life cycle. The general answer would be reductions or adverse changes in the factors that have created their rapid growth in the first place. The current forecast produced by the DETR used the following inherent assumptions in reaching its conclusions.

8.4.1 Factors affecting Travel Demand

The main drivers of travel demand are economic growth measured in terms of GDP Growth. High rates of GDP growth create a virtuous circle of higher disposable incomes, higher business activity and higher demand for business and leisure air travel. The assumptions of economic growth and their trends in the UK and Western Europe have already been covered in an earlier section. In

this forecast they averaged for the period of 2002-2015 at 2.25 percent for the UK and at 2.1 for the whole of Western Europe as defined by the International Monetary Fund.

8.4.1.1 Trade Volumes

This area is one of the indicators of the current state of economic activity. During the early stages of the economic cycle its growth tends to be faster and higher than GDP growth although in the longer term the two rates converge and stabilise. For the low cost airlines this parameter is not very important, as there is a fairly small proportion of their traffic affected. However it is possible that over time and as these airlines' market matures then it will start gaining significance in their forecasts, particularly if they start attracting business travellers in larger numbers.

8.4.1.2 Exchange rates

The relationship between the exchange rates and air travel demand is not entirely simple, as an appreciating pound should make travel more attractive for residents of the UK but have the reverse effect for residence in Europe. It is nevertheless stipulated that there is a positive relationship as there are more UK residents starting trips from the UK than European residents travelling from Europe. Currently with the establishment of the Euro as the only currency within the EU, this area has been considerably simplified. A three way interaction still exists between Sterling, Euro and Dollar since many of an airline's external payments for aircraft, leases, fuel etc are in dollars.

8.4.2 Factors affecting Air Fares

GDP growth is a major determinant of the growth in demand for air travel because, higher levels of GDP produces higher growth rates which in turn produce growth in demand for air travel.

In addition to that air fares also affect this, so the factors examined below contribute either positively or negatively.

8.4.2.1 *Aviation fuel prices :*

With the price of oil having recently risen steadily during the last year, propelling the jet fuel prices from around 45 U.S. cents a gallon in spring 1999 to nearly 110 U.S. cents in autumn of 2000, has since been falling to an average of 78 U.S. cents per gallon. In the longer term it is expected to decline further following the value of the price for a barrel of oil. Although all airlines hedge their fuel to some degree, a sustained price increase could possibly wipe out any savings and cause an increase in their costs, which would have to be passed onto the passengers. According to the DETR calculation, fuel is approximately 10 percent of costs so that even a 50 percent change in the price of oil has a modest effect. Last years' increases were in the region of 144 percent, from trough to peak, although they have since fallen to around 73 percent.

8.4.3 Competition and deregulation

A more deregulated market despite the variety of barriers and imperfections it still possesses is conducive to lowering fares. The usual historic trend of a reduction of 2 percent per annum which driven by improvements in aircraft technology, changes in traffic types and other structural changes of the industry brought about by factors as hub and spoke networks and airline alliances have reduced this trend growth to –1.0 percent.

9 FUTURE DEVELOPMENTS

9.1 *SCENARIO POSSIBLE*

The air travel market has historically consisted of the scheduled and charter airlines. Charter airlines came into being in the mid sixties because of the need to by-pass the IATA fare restrictions. They were developed in their current form solely in Europe because the very high airline fares were making foreign travel prohibitively expensive for the average family. Furthermore they by-passed currency controls, because all the payments were done in the UK before departure.

IATA has not attempted to bring the non-scheduled operators under its control but instead allowed them freedom, as they did not pose a threat to the flag carriers. Some of the flag carriers had their own in house charter company and airline. (BA, with Sovereign and British Airtours, Lufthansa with Condor etc.)

Non-scheduled EU operators have thus enjoyed ease of route entry and exit, and have been allowed to sell some of their capacity as seat only tickets at low prices. During the EU liberalisation process the non-scheduled sector was also deregulated by allowing any operator to set up in any other European country subject to satisfying the same criteria applicable to the scheduled sector.

It is anticipated that recent developments will further blur the differences between the two market segments.

9.1.1 A two - tier scheduled market

9.1.1.1 Large scheduled groups for international & Long-haul

The arrival of the low cost carrier is not going to change the face of the market suddenly. Despite the continuous advertising campaigns, the majority of passengers will continue to use the main line carriers. The attractiveness of full service carriers will not dissipate easily, provided the fares remain within reasonable levels.

All the marketing tools aimed at the regular business passenger these carriers have developed will remain strong for the foreseeable future. Nevertheless, this does not exclude the possibility that the same passengers flying on a main line carrier will not at some point try a low cost operator, whether it is for a summer holiday or a short break.

Low cost carriers will remain a very localised development of the EU market for the next few years. It is highly unlikely they will try to enter the long haul international scheduled markets, which will remain the realm of the big alliance groupings and their partners. The slot restrictions at most major European hubs will certainly ensure that. Even, in the unlikely event that the EUC allows slot trading, such slots will be far outside the budgets of small carriers like Ryanair and easyJet.

With respect to the intra-European traffic, alliances as they become more integrated will in fact lock out any international passenger on a transatlantic journey from the reach of an intra-european operator, unless the operator is a franchisee of the alliance. Even if that was not the case the low cost operator

would not be able to accommodate this traveller, unless the passenger specifically required it.

The problems for the network carriers will start appearing when the low cost operators achieve adequate size and begin challenging them, as some of them already are, on their more lucrative routes. For example one of easyJet's stated aims is to capture Swissair's golden route between Geneva and Zurich, both of which are currently served from Luton.

Attempts of an incumbent airline creating a low cost subsidiary, as was the case with BA's creation of GO have proved unsuccessful. Although BA was keeping a hands-off approach with GO, it has decided to divest itself from it and concentrate on its core business. Currently KLM is also practising the same strategy with 'buzz' only this has been attempted in reverse by de-merging 'buzz' out of KLMuk. Buzz's weaknesses lies with its ancestry, a less productive aircraft type, and an uncertain fare structure. Experience from the U.S. shows that all low cost subsidiaries of full fare airlines have not achieved performances similar to Southwest and eventually withdrew from the market.

9.1.1.2 LCCs for intra Europe & ad hoc leisure

The immediate future lies in increasing their presence within Europe by continuing to serve a combination of summer/winter leisure points as well as the more traditional main cities, but from 'alternative', secondary airports.

In the past, due to the high cost of travel, particularly from regional and secondary airports, there were many destinations for which air travel was unthinkable, either due to the cost or because the national airlines did not serve

them sufficiently i.e. London – Belfast, an early deregulated market. Now, this is gradually changing, as new destinations in France, Italy, Spain, Germany and Scandinavia are receiving scheduled service. By creating this possibility the low cost carriers are slowly changing travel patterns by initially attracting passengers who accept the lower fares to the new places, some of which are very likely to repeat the same trips several times or to other similar destinations. The next stage will be to create alternatives to the traditional Spanish resorts since some of the seaside points served start gaining acceptance from holiday makers from abroad, instead of from only the locals of the country. Airports in these destinations will follow the development of provincial airports in Spain and the Greek islands, which during the summer season, the national carriers' flights are in a minority if compared with the European charter operators.

Increasingly targeting the 'holiday routes' will bring low cost operators into competition with the charter carriers. As already seen there is a great number of charter only routes able to accommodate scheduled low cost carriers.

Their larger size as a whole, currently four times the size of the low cost carriers in terms of ASK, will provide a barrier to rapid growth into these charter markets. The reaction of the charter incumbents is not as straightforward as with any other single airline because the charter's routes are in effect dictated by their tour operators.

Much will depend on the changing habits of holiday makers and whether greater acceptance of booking complete holidays independently or via the Internet will allow them to create their own holiday packages, taking advantage

of the cheap flights. Changes of this nature will also depend on age and income groups. Independent leisure travellers not requiring accommodation or prepared to make their own arrangements will be increasingly attracted by the flexibility and the low prices offered by the low cost carriers. Doganis (2001) stipulated that between 10 to 15 percent of the passengers currently carried on these routes would travel on the low cost carriers.

9.1.1.3 Charters for package holidays.

In theory, if European deregulation was fully realised then charter flights could become obsolete. However, for most families wanting to book a holiday in the sun, tour operators and their associated airlines offer a service that is still valued because under the right conditions it removes all the inconvenience of dealing with individual parts of the holiday from the consumer.

In the past some charter airlines have attempted to fly very low frequency scheduled services mainly to Spain, serving the community of British ex-pats there. These were withdrawn however once competition from low cost carriers was encountered.

In the seventies and early eighties their aircraft sizes were classic examples of the need to transfer large numbers of passengers cheaply. For the shorter intra-european routes they used the early 737-200s and in due course slowly moved to the 737-300, with 140 seats and then to the A320 with 180 seats. The A320 is the smaller type available while the largest would be the 767-300 or the A330-200. Other charter carriers are known to use DC-10 / MD-11s (Martinair, Scanair) or even 747-200s (Corsair). The average UK charter seating capacity

was 224 compared with that of the low cost operators is around 140 seats (higher than the mainlines' 130 seats)

The economics of charter airlines, with time have been finely tuned to the specific markets they serve. The product of the charters is tailored to the needs of the tour operator and in the cases of seat only fares there is very little flexibility. Although the restrictions are not the same type as for the scheduled operator, any passenger has to conform to the times and days of a pre-arranged flight. Furthermore, the extensive use of night time flights aimed to avoid the curfews in the UK make these flights considerably undesirable for regular travel. Although on short haul flights, travellers are becoming more accepting of the inconvenience and 'no frills' in return for savings in fares, it will be difficult to persuade them to cope with a 4 hour plus flight under the same conditions. As a recognition of that charter airlines are now making a 'premium class' available in their long haul flights for an extra payment.

Charter operators can provide low frequencies to a destination because their passenger capacity is fixed by the tour operator who knows in advance the number of people booked in one flight. They do not have to compete for passengers in the traditional sense and thus frequency is more of a function of rostering aircraft and not of generating traffic demand. This gives them a considerable cost advantage over the 'no frills' operators.

In addition they have operated much larger aircraft than the low cost operators have and at the very high load factors they achieve it is possible to restrict their frequencies. The airline's economics encourages the use of larger aircraft on

longer routes because the unit costs and performance in general are much improved.

In the last decade charter operators have experienced considerable growth in holidays to more distant and exotic destinations to satisfy their passenger's increasing search for new places, beyond the usual Mediterranean resorts. It is therefore possible that some intra-european market capacity could be transferred to the scheduled mode.

9.2 AREAS OF POSSIBLE CONFLICT

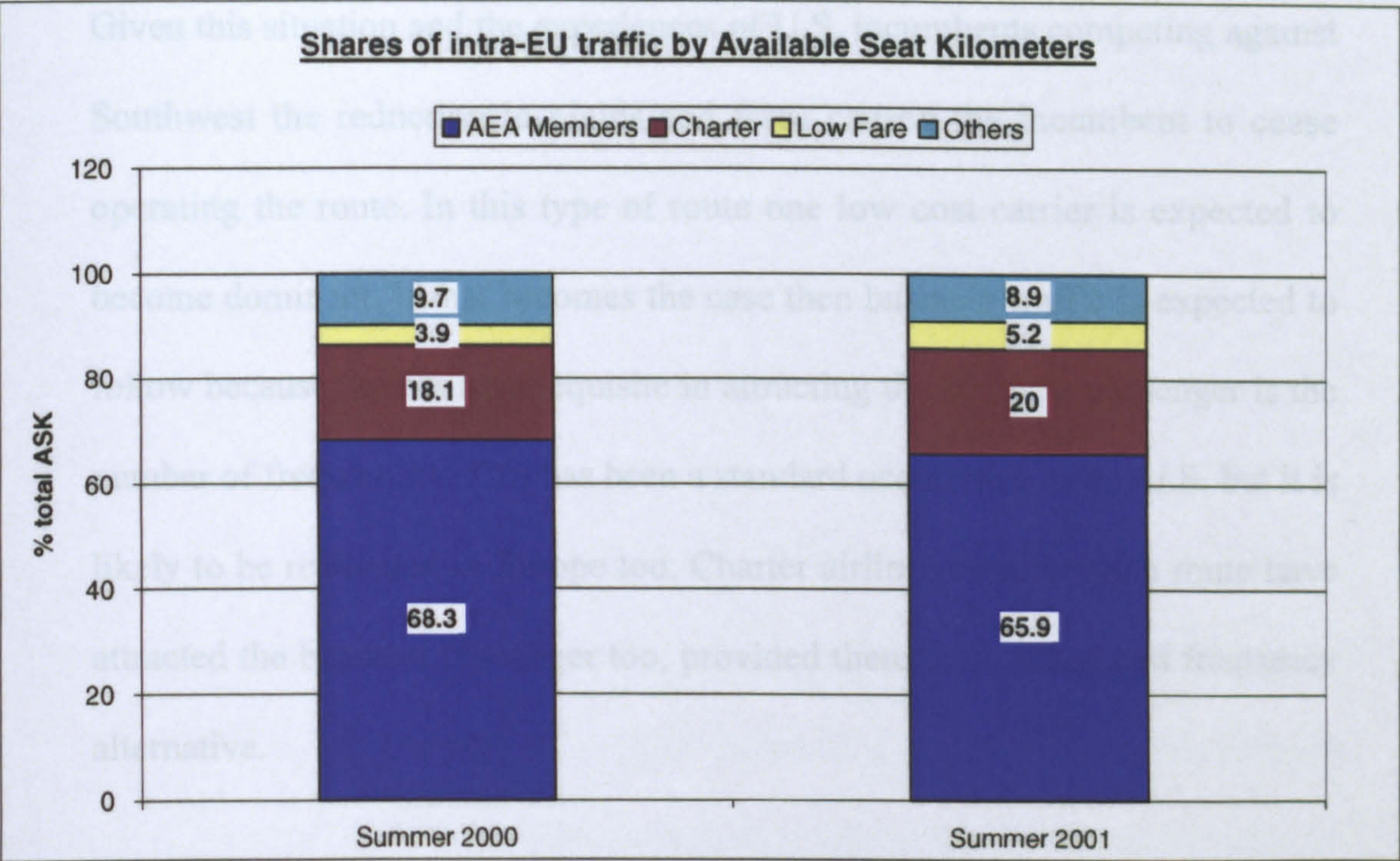
9.2.1 Barriers due to market environment

One of the main barriers possible in the near future is that of the effects of a maturing market. Although for the next few years forecasts predict traffic will grow at the current rate, beyond 2005 this rate will decline. In the intervening years low cost airlines will have spread their route network to as many suitable destinations as they can find in Europe.

Scope for new growth will be more difficult to achieve. Currently there are 10 routes out of London been contested by at least 2 low cost operators, as well as by mainline carriers. Although some of these routes are dense enough, within the low cost sector there will no doubt be fierce competition, resulting in some extremely low fares particularly during off peak periods. This will be aggravated by the need of low cost airlines to grow further while the incumbents also try to retain their passengers.

During the summer of 2001 low cost carriers were due to operate 5.2 percent of the available seat kilometres within Europe. Although compared to the

previous year they grew by 33 percent, collectively they are still a very small part of the market capacity as a whole.



Source: AEA (2001)

Fig. 9.1: Intra EU Shares of EU airlines

Even at the present phenomenal rate they will need at least 6 years to reach the current level of the charter carriers. Also, if in the near future other low cost carriers appear based in other countries then there will be higher still levels of competition.

Apart from the economic indicators affecting generation and growth of traffic demand and which were examined in the sensitivity testing section of this report there are a number of other external factors consistent with increased competitive pressures, and market saturation.

Signs of the ongoing competition is sometimes exhibited by recent court cases like: Ryanair vs. BA (on fare setting), easyJet vs. BA (regarding illegal

subsidising of GO), as well as a variety of newspaper advertisements about punctuality levels and comparable fares.

Given this situation and the experiences of U.S. incumbents competing against Southwest the reduction in yields and fares caused the incumbent to cease operating the route. In this type of route one low cost carrier is expected to become dominant. If that becomes the case then business traffic is expected to follow because the main prerequisite in attracting the business passenger is the number of frequencies. This has been a standard occurrence in the U.S. but it is likely to be replicated in Europe too. Charter airlines dominating a route have attracted the business passenger too, provided there is no scheduled frequency alternative.

Europe represents a geographical area of diversity. So far it remains an economic grouping of individual countries with individual traditions, and social characteristics. Europe in 2001 has not achieved anywhere near the same level of marketing integration as the U.S. despite the EUC's best efforts to achieve the Single Market. Barriers still exist across borders in term of different national and local languages, national-specific regulations and artificial barriers blocking the free flow of information across Europe. In this respect the introduction of the single currency in Europe will be beneficial to consumers because it will allow them to see clearly real differences in prices, devoid of any exchange rate adjustments. The wide use of the Internet by the low cost carriers certainly slightly improves the situation but nevertheless

information in Europe is not readily available as in a one country market of the USA.

Prospects of free movement of people and labour, as originally envisaged in the Treaty of Rome are very weak across EU at the moment. Lack of cross recognition of qualifications in engineering, management, and maintenance levels all form barriers for airlines trying to exploit lower wage scales of workers from other EU countries. A typical example of this were the problems encountered by Virgin Express in Brussels in trying to achieve more flexible working practices together with increased productivity from the Belgium based workforce. An entrenched and inflexible unionised workforce is anathema to the flexibility required by a low cost airline if it is going to be able to react quickly and effectively in rapidly changing markets. In this case the solution of placing the workforce in a newly formed, separate, non unionised company based in a low social cost EU country, was the answer which in the end was achieved with some considerable turbulence.

9.2.2 Problems stemming from growth

Growth of any company from an upstart to a medium size always carries with it particular challenges. In the case of low cost airlines the core problems would be maintaining the cost advantage unaltered or with as small change as possible. Maintaining a lean and highly productive operation while growing is critical for the future.

It remains to be seen whether the managements of these airlines will be as focused as before or even that their choices will continue to pursue their initial

philosophy. A variety of opinions indicate that on several fronts there will be difficulties encountered.

Firstly, in the area of achieving lower airport charges. The CAA believes that it will be increasingly difficult for a 30-40 aircraft company to expect the same discounts as that of just a few aircraft. This will apply in both cases of the home base airport as well as at any existing or future destination airports. Ryanair has already experienced efforts by Aer Rianta, the operators of Dublin airport, to abolish or drastically reduce discounts offered for operations during the off peak months, or for starting new discount routes as well as for use of existing airport infrastructure. On the other end of their routes they had to withdraw from operations at Rimini airport because it sought to renegotiate the existing contact it had with Ryanair. In a tactical decision they have allocated any route growth to be from Stansted rather than Dublin.

Employee remuneration is another contentious issue. Employees might accept lower wages in order to enable a new company to establish itself. However when the company is very profitable they expect to gain better remuneration for their efforts. Southwest dealt with this by agreeing a ten year pay freeze from its employees in exchange for share options of the airline's stock. From the European airlines only Ryanair has so far emulated this. It is possible that as in the case of Southwest the share options are used to mask low wage scales, being considerably lower than the mainline carriers. In Europe however this will be less of a case as the wage scales offered by the low cost carriers are

lower than that of the flag carrier but comparable to other UK independent carriers i.e. British Midland and most of the charters.

9.2.3 Barriers due to infrastructure

Low cost carrier's philosophy of generating new traffic through low fares goes together with serving their airports with high levels of frequencies. For this they require a significant number of slots which might be available at an unconstrained home base airport but are not so easy to obtain at other large airports in Europe. This problem is somewhat overcome by their use of under utilised secondary airports. However several of the low cost airlines' destinations are to main hub airports e.g. Madrid, Athens, Paris CDG, Milan or Palma and Malaga. Most of these airports suffer from congestion and are regularly near the top of Europe's airport delay figures. Increasing frequencies to them in order to undermine a weaker competitor, they will be subject to the same types of restrictions as the others. Their need to grow will result in finding more under-utilised airports. Fewings (1999) indicates that there is a plethora of under-utilised airports in European countries with runway lengths more than 1600m. The concentration of flag carriers at their hub airports which they controlled via the slot system has restrained the development of non hub airports in Europe. Civilianisation of military airports not required by a contracting military will add to the numbers of available airports looking for customers. Passengers' preferences of local airports will add impetus to this trend and this is driving rapid growth of traffic in regional airports during the last few years.

The current growth plans of the low cost operators have consisted of initially achieving a considerable presence in their original choice of routes. From this they have added capacity as they saw fit to place them in the top 3 operators of that route. Once this hub was operating efficiently then a choice for moving to a second hub was made. The candidate hubs were sometimes destinations already served from their original base. Selection of a hub obviously depends on several factors but the more important ones are the agreement on charges to the airline and the traffic generation capability of the airport's catchment area. Growth into the new hub was by serving existing points in their networks first and later perhaps introducing new routes as appropriate. This is a low risk approach as at least one end of the route is a known destination, and the possibility always exists for the another existing destination to replace under performing destinations from the new hub. The added advantage of that is that the airline's position is further reinforced from both ends of the network.

9.3 ISSUES FOR POLICYMAKERS

The globalisation of markets, the introduction of the Euro, the completion of the single market continue to generate high levels of merger activity in Europe. In a context where markets are tending to become wider and where the critical mass that is necessary to be an active player is tending to increase, the number and complexity of mergers and alliances call for increasing vigilance from policy makers. It is noteworthy that the airline industry is still highly fragmented, with the six largest companies accounting for only 30 percent of

the market (Source: AEA), compared with 79 percent in the petroleum industry and 62 percent in the automobile industry.

With respect to the development of the low cost scheduled sector, European liberalisation is beginning to provide some welcome benefits for the consumer. At the same time it has freed the flag carriers from their archaic bilateral agreements, with the results of creating new large alliance groupings. The benefits of these groupings could be that they reduce duplication in the market and thus increase the overall level of efficiency. The increased size of these groupings and even of the flag carriers should not be allowed to thwart any efforts by the low cost carriers to fill the void left by the incumbents particularly if it has been successfully demonstrated that their ability to do so under the same consumer welfare benefits is at least limited.

Further pressures for the privatisation of the remaining state owned airlines in Europe will certainly help along this aim. Therefore the Commission's task as a policy maker and its enforcement capabilities will be of paramount importance in ensuring the market develops in a free and fair way.

So far in the last year, the Commission is due to finalise its position on the important intra-EU and transatlantic alliances. It will also undertake a consultation on the possible anti competitive effects of the current passenger tariff consultations in the IATA framework²², which could result in the first

²² These industry-wide arrangements are covered by Commission block exemption regulation No 1617, which expires on 30 June 2001 (CEC 2001).

official stage of dismantling them, at least as far as the U.S. and European members are concerned.

Latest European Commission proposals to amend the 1993 Regulation on airport slots have come under fire from the Association of European Airlines and its members, who believe that the Commission has reneged on a promise made last year to limit this stage of the legislative process to technical matters.

9.3.1 Alliances

Consolidation in the air transport sector continues apace, and the Commission examined a number of alliances and mergers during the year. In general, the Commission allows airline alliances provided it can be demonstrated that they bring benefits for passengers by extending networks and improving efficiency. However, alliances can also significantly restrict competition on individual routes and remedies may need to be imposed to mitigate this.

Swissair, Sabena, TAP, AOM and Crossair, all members of the Qualiflyer alliance, came under the Commission's scrutiny regarding the termination of an agreement that allowed them to co-ordinate fare prices.

Lufthansa and SAS' closer co-operation with Austrian Airlines, under the Star Alliance would eliminate competition on a large number of routes between Austria and Germany and between Austria and Scandinavia. The initial step of a wider investigation was started in 2000.

Other alliances investigated were between British Midland, Lufthansa and SAS, and the U.S. Air/United merger. On the latter alliance the Commission sought only undertakings, patently avoiding getting embroiled in the U.S. airline industry merger activity.

The above activity in a single year indicates the amount of restructuring currently unfolding in the European market. The Commission will investigate and sometimes take action after an investigation that might last anything up to 2 or 3 years. By the time the recommendations are announced it is too late for the airlines that have suffered under these anti competitive groupings.

The application of economic theory is a perfectly legitimate endeavour but in dynamic liberalised markets it can never be retrospective but preventative for the future. The question is will the market remain unaltered until that time?

9.3.2 Airports

Landing fees and their application in Finland, Portugal and have been investigated in the case of Finland ordered to end discriminatory practices. A similar situation was investigated for the Spanish airports whose charge setting discriminated against foreign carriers landing at Spanish airports. A similar situation was rectified in Italy. Ground handling charges at French airports were also adjusted with a new system of non discriminatory commercial rate charges.

Cases involving airport charges and ground handling discriminatory practices reflect the tendency of previously monopolistic organisations to obtain economic rents, despite now operating in a newly liberalised market. Reform

of past behaviour in terms of changing the working practices and internal cost structures are more difficult to achieve and take longer periods over which these changes can be established. In the short term a mixture of past and present behaviour prevails.

10 CONCLUSIONS

10.1 INTRODUCTION

In this chapter the technical, theoretical and policy conclusions of the study will be presented. Any shortcomings in the method or other specific areas will be outlined and finally a number of suggestions for further research will be made.

The objective of this research was to explore the current economic characteristics of the scheduled low cost carriers in Europe and to provide an insight as to how these carriers will use their advantages over the main line carriers to exploit markets and sustain their growth into the future.

The U.S. deregulation has shown that low cost carriers have considerable cost benefits and by using them can achieve large potential inroads in to the markets served by the incumbent airlines. At the same time there has been considerable turnover of these companies significant numbers of which have failed. The most successful carrier in this sector is Southwest Airlines, which has achieved constant growth and profitability continuously from its inception until today. Its philosophy of marketing and operations has become the model for all its European imitators. This model has been imitated by a number of European scheduled low cost carriers which have entered the market since the mid 90s. In Europe the most successful of these has been Ryanair, which has had the longest operating time.

One of the barriers in carrying out this research has been the lack of adequate cost data for the different aircraft types. Although other factors such as Indirect costs also form a large part of the total, the levels of the Direct Operating Cost data form the core of the cost of an airline operation. Due to the sensitive nature this type of data it was impossible for a non-airline person to obtain accurate information.

A model was thus developed to simulate the direct costs of operations of a low cost airline. The model provided information about the cost per distance flown for an airline flying on a given route.

For the design of the model, a number of operational variables were used and expressed either directly or using accepted relationships from current airline design data. Examples include: stage length, block fuel and times, number of seats, seat load factor, en-route fuel consumption, and aircraft and propulsion specific technical data. These variables were put together to calculate individual shares of the overall total sector costs. The costing for a variety of aircraft types were obtained in order to have a library of fully costed aircraft types which could be used in an airline operation.

Following that a number of route surveys were undertaken to provide candidate routes for use by the low cost operator. In the initial route survey 254 intra-European routes were tabulated for sector distance and block times and the derived costs were applied to them to obtain full costings of the low cost carrier being simulated, but also of 5 other known UK airlines representative of a full fare scheduled carrier, two low cost scheduled carriers, one regional carrier and one large charter carrier.

Subsequent to that a small scale airline operation was simulated by creating two different types of schedules, one to reflect the type of scheduled low cost operation with high daily frequencies with short turnaround times. The other to reflect the operation of a full cost independent scheduled operator, providing a mix of business and leisure intra-European routes and subject to the operational constraints this imposes on the airline. The latter schedule type was loosely based on British Midland.

The general characteristics inherent in a low cost carrier used were: the single type of aircraft flown, the higher seating density configuration used, high load factors, high rates of utilisation of both crew and equipment and very close attention to limiting indirect costs. These were all reflected in the schedule set up.

The other component of this study involved a method whereby prediction of the kind of city pairs available for entry by a scheduled low cost carrier was made. Here, it was aimed to discover the performance derived from the two set ups above and how this could be translated to new route entry.

For this stage a further route survey of 381 intra-European routes was undertaken. These were grouped into scheduled routes which the CAA estimated were likely to have new entry, others where this likelihood was lower, leisure or purely charter routes, and purely domestic routes.

For all of these the frequencies, number of competitors currently operating, sector distances and block times were tabulated. Projections about their compatibility for low cost entry were then made using the assumption of a low cost carrier entering a particular route with a single dedicated aircraft. Traffic

densities attainable by a low cost operator entering this route under these assumptions were calculated taking account of the 'S' curve relationship between frequency share and passenger share achieved.

Criteria for the acceptance or rejection of a route were set up and applied . Furthermore, the criteria were extended to classify the reasons of the routes rejected as not compatible in terms of traffic density and passenger market share obtained. The optimum amount of frequencies possible using a smaller and a larger size of aircraft were also found.

The limitations of the methods used, firstly concerns the need to simulate the Direct Operating Costs. Although this was necessary, the overall integrity of this task has not been compromised due to the fact contemporary relationships in the parametric formulation have been used, as verified by typical industry sources as the standard AEA formula. Additionally, the values used have represented current rates of fuel consumption, cost and labour remuneration.

In establishing the overall costs for a single type of an airline the specific airline's economic ratios of operation have been used to a large extent. It is therefore believed that the cost differentials between different types of carriers, i.e. 'full frills', low cost, and charter have been maintained and permeate through the rest of the projections.

10.2 OPERATIONAL CONCLUSIONS

In total 126 routes were found compatible for new entry by a low cost carrier. The routes having London Heathrow at one end were the more promising, as they tended to have higher traffic densities. The majority of these routes were

duopolies with a single monopoly route. Out of a total 15 routes only 5 of them were being operated intensively enough to preclude new entry because a high enough market share would not be achievable.

In the next group of routes, classified as previously likely to have new entry after full liberalisation, only five were suitable, the remainder were equally split between either low density or low market share attainable. From the previously less attractive group only three routes qualified as the rest were all rejected under the low density criterion.

The most remarkable results were obtained in the leisure and charter grouping. Here, out of 258 routes examined nearly 40 percent were suitable, some of which were by very large margins indeed. Of those rejected it was predominantly due to their low market share.

Finally, none of the domestic routes provided scope for low cost new entry as they invariably failed with very low market shares.

Putting these results into perspective, low cost carriers have the following areas where they can fulfil their potential:

Against the incumbent flag carriers on the main European trunk routes; against the incumbents on the secondary and scheduled leisure routes in Europe; against the charters on routes not served by scheduled carriers, the typical summer holiday destination.

10.3 GENERAL CONCLUSIONS

The fact that air transport has been historically one of the most regulated modes of transport, has allowed governments to consistently interfere with the state owned flag carrier. European liberalisation, has taken a long time to arrive and has been brought about by the need to provide a better and more efficient air transport sector.

Unlike U.S. deregulation, euro-liberalisation has been introduced in a gradual manner, using a series of liberalising packages which removed regulatory barriers in several steps. This reflects the lack of homogeneity of Europe as compared to the US and its different industrial structure. The state owned airlines, the political cost involved in taking unpopular decisions for the national carrier, the state control of airports and infrastructure and the chronic under-investment, have been only a few barriers. Evolution of the EU reforms has been slow and for a few years after the market was fully deregulated there was hardly any obvious change. Then, the first of a number of low cost carriers appeared.

Reforms have eventually caused changes in the internal structure of European air transport, but the reforming process is not complete. Areas such as ground handling, airport charges, and access have been dealt with but there is still some way to achieve the full benefits envisaged in the start.

The gradualist approach has as its disadvantages, allowing the incumbents to react and assemble different structural barriers to those existing before. This has been seen in their response of creating global alliances, acquiring any

domestic or regional competitors and operating their home airports as network hubs with increased amounts of connecting passengers. Naturally, this can be explained as genuine market responses for companies maximising their shareholders' wealth. Increased vigilance is thus required to guard against any anti-competitive effects produced. Public policy makers are thus required to intervene at the first opportunity to safeguard enhanced consumer benefits.

The scheduled low cost airlines are a thriving sector experiencing rapid growth, which is set to continue in the next few years. Since the time of their inception they have entered markets otherwise unknown to travellers and because of their low fares have created considerable amounts of traffic where otherwise there would be none, or where traffic was falling. In generating these new markets they are beginning to change the travelling habits of the public who are taking advantage of the low fares to make more frequent trips.

Although, currently they are only a small share of the total European traffic, they have become well known due to intensive advertising campaigns. Their philosophies are aimed at entering routes by serving them with a combination of low fares and high frequencies which will quickly allow them to become dominant, thereby squeezing out any competitors. For this they need a very low cost structure. To achieve this they use a lean and productive operating structure along the lines of the virtual airline where only the flight operations function is undertaken by the airline itself. All other functions are outsourced.

At this early stage growth is very important for all these airlines, some of which have achieved rates 20 percent or higher. Herein lies the danger as the

original role model in the U.S. achieved its amazing performance through low steady growth. Other high growth U.S. low cost operators eventually failed. So far in the European market there has been only one such failure.

Continuous growth on the leisure sector will eventually lead to challenging the charter airlines. They, like the scheduled low cost carriers, are very efficient operationally; vertical integration with a tour operator who is responsible for the provision of their traffic to them plays a major part in achieving their efficient structures.

The conventional carrier response to these airlines has been patchy so far with BA setting up a low cost subsidiary from which it eventually moved away. KLM has also created a similar airline using a previous subsidiary as its base.

Past experience in the U.S. indicates that no mainline carrier has successfully created a low cost subsidiary that could replicate the low cost structure of Southwest.

Looking into the future the possibility remains that a new scheduled low cost carrier will appear in another country within the EU. Countries in central Europe currently applicants to join the EU have considerable lower costs, which could be put into good use by a locally based low cost carrier. Any new competitor entering now however will encounter an increasingly competitive environment in which some consolidation will be a prerequisite for further growth.

10.4 AREAS OF FURTHER RESEARCH

The success of the low cost's point to point mode of traffic has led some people to question the economic efficiency of the hub networks so favoured by the mainline carriers. Southwest through its low fares and high frequencies has been able to enjoy market shares of over 50 percent in more than half of its top 100 city pair markets. In this manner it has become the dominant carrier and in many cases the incumbents have been forced to exit routes affected by the entry of Southwest. Although there are some routes served by the low cost operators where they are dominant it is only so because either there is a very low traffic density, or because these routes are traditionally served by charter airlines. Hence there is no similar example in Europe to that of the U.S.

Nevertheless, low cost carriers serve some hub airports in Europe. The E.U. Commission plans to reform the slot availability at Europe's congested airports in order to allow greater access to new entrants and to discontinue the current practise of incumbents of using 'grandfather rights' or franchisees to hoard the slots for future expansions.

- i. Further work could examine firstly the possibilities and the effects on the low cost carriers of entering these hubs, and secondly what inroads they would make to the incumbent's traffic, and by how much these hub operations would be weakened on intra-Europe routes. Also, whether there is enough airport capacity available for setting up a hub, similar to Charleroi.

- ii. Given Ryanair's setting up new hub airports away from its home base, firstly in Stansted and more recently in Charleroi, what are the other potential candidates for attracting other low cost carriers, and how their catchment areas differ, if at all, from those of the traditional hubs. Whelan (1998) has investigated the predisposition and levels of dependency on air transport in 13 nations of Europe. Therefore the combination of a high dependency to air transport with lack of competition on routes from the main airports of that country could be included to provide a more accurate picture.
- iii. As the low cost carriers grow and also become more dominant on their routes, there will be cases where they will be monopoly carriers. So far the consensus is that low cost carriers have lower costs because they are small, new and fly short sectors. With some of them due to exceed 40 aircraft, in the near term, an investigation could examine their ability to maintain these low cost structures over time, coupled with the fact that slowly the number of suitable routes available to them will decline, due to the smaller geographical area of Europe.
- iv. As mentioned earlier, one of the potential markets exhibiting considerable promise is that currently, served by the charter operators. Given their scale of operation they will form a natural barrier to the continuous expansion of the 'no-frills' carriers. An interesting proposition would therefore be to study how the charter carriers would react to any considerable encroachment of the market by the low cost carriers. What methods are available to them and how that would affect their competitiveness compared with the 'no-frills' airlines. Furthermore to

what extent their vertical integration to their tour operator reduces their flexibility.

- v. This research, by definition of its title has focused on the future of the low cost carriers. There are many other areas concerning these type of carriers that are worth investigating. One such area is that of profitability. Here, again there are barriers because until very recently all with the exception of Ryanair have been privately owned companies. Therefore only Ryanair's financial data were publicly available after their stock exchange floatation in Ireland and the U.S. easyJet has recently undergone a part floatation and its data are now available from various analysts or from its web site. The long term profitability of these firms are worth of investigation to see to what extent the success of Southwest can also be replicated here.

APPENDIX A

AIRLINE IDENTIFICATION INDEX

8D	VOLARE AIRLINES	JK	SPANAIR
9G	GALAXY AIRWAYS	JY	BRITISH EUROPEAN
A3	AEGEAN AIRLINES	KF	AIR BOTNIA
A6	AIR ALPS AVIATION	KL	KLM - ROYAL DUTCH AIRLINES
AB	AIR BERLIN	LH	LUFTHANSA
AF	AIR FRANCE	LT	LTU INTNL AIRLINES
AP	AIR ONE	LX	CROSSAIR
AY	FINNAIR	NB	STERLING
AZ	ALITALIA	NG	LAUDA AIR
BA	BRITISH AIRWAYS	NI	PORTUGALIA
BD	BRITISH MIDLAND BMI	OA	OLYMPIC AIRWAYS
BU	BRAATHENS ASA	OS	AUSTRIAN AIRLINES
DE	CONDOR FLUGDIENST	PE	AIR EUROPE
DI	DEUTSCHE BA	Q7	SOBELAIR
DM	MAERSK AIR	RD	ALITALIA TEAM
DP	AIR 2000	SK	SAS SCANDINAVIAN AIRLINES
E8	ALPI EAGLES	SN	SABENA
EI	AER LINGUS	TP	TAP AIR PORTUGAL
EN	AIR DOLOMITI	TV	VIRGIN EXPRESS
EW	EUROWINGS	U2	EASYJET
FR	RYANAIR	U8	AUSTRIAN AIR TRANSPORT
FU	AIR LITTORAL	UK	KLM UK
G7	GANDALF AIRLINES	UX	AIR EUROPA
GO	GO FLY	VM	REGIONAL AIRLINES
HF	HAPAG LLOYD	VO	TYROLEAN AIRLINES
	FLUGGESELLSHAFT	VR	TACV - CABO VERDE AIRLINES
HV	TRANSAVIA	WF	WIDEROE'S FLYVESELSKAP
IB	IBERIA	X5	CRONUS AIRLINES
IG	MERIDIANA	XK	CORSE MEDITERRANEE
IJ	AIR LIBERTE	XN	AXON AIRLINES
IQ	AUGSBURG AIRWAYS	YP	AERO LLOYD
IW	AOM FRENCH AIRLINES	ZB	MONARCH AIRLINES

APPENDIX B

DESTINATION CITY IDENTIFICATION INDEX

ABE	ABERDEEN	EMA	EAST MIDLANDS
ACE	LANZAROTE	FAO	FARO
AES	AALESUND	FLR	FLORENCE
AGP	MALAGA	FMO	MUNSTER
ALI	ALICANTE	FRA	FRANKFURT
AMS	AMSTERDAM	FUE	FUERTEVENTURA Canary Isl.
AST	ASTURIAS	FUN	FUNCHAL - Madeira
ATH	ATHENS	GEN	GENOA
BCN	BARCELONA	GLA	GLASGOW
BER	BERLIN	GRZ	GRAZ
BES	BREST	GTH	GOTHENBURG
BGO	BERGEN	HAJ	HANNOVER
BHX	BIRMINGHAM	HAM	HAMBURG
BIA	BASTIA	HEL	HELSINKI
BIO	BILBAO	HER	HERAKLION
BIQ	BIARRITZ	HLB	HELSINGBORG
BLL	BILLUND	IBZ	IBIZA
BLQ	BOLOGNA	INS	INNSBRUCK
BOD	BORDEAUX	JOE	JOENSUU, FINLAND
BRE	BREMEN	JRZ	JEREZ
BRI	BARI	LBA	LEEDS-BRADFORD
BRU	BRUSSELS	LCG	LA CORUNA
BVA	PARIS - BEAUVAIS	LCY	LONDON CITY
CAG	CAGLIARI	LEJ	LEIPZIG HALLE
CDG	CHARLES DE GAULLE	LGW	LONDON GATWICK
CDW	CARDIFF	LHR	LONDON HEATHROW
CGN	COLOGNE BONN	LIL	LILLE
CPH	COPENHAGEN	LIN	MILAN LINATE
CRL	BRUSSELS - CHARLEROI	LIS	LISBON
DRS	DRESDEN	LNZ	LINZ
DUB	DUBLIN	LPA	LAS PALMAS
DUS	DUSSELDORF	LPL	LIVERPOOL
EAP	BASLE-MULHOUSE	LTN	LONDON LUTON
EDI	EDINBURGH	LYS	LYON SATOLAS

MAD	MADRID BARAJAS	RNB	RONNEBY- SWEDEN
MAN	MANCHESTER	ROM	ROME
MIL	MILAN	RVN	ROVANIEMI - FINLAND
MPL	MONTPELLIER	SCN	SAARBRUCKEN
MRS	MARSEILLE	SKG	THESSALONIKI
MUC	MUNICH	STN	LONDON STANSTED
MXP	MILAN MALPENSA	STO	STOCKHOLM
NAP	NAPLES	STR	STUTTGART
NCE	NICE	SVL	SEVILLE
NCL	NEWCASTLE	SXB	STARSBURG
NUE	NURNBERG	SXF	BERLIN SCHONEFELD
OPO	PORTO	TCI	TENERIFE - CANARY ISL.
ORY	PARIS ORLY	TLN	TOULON
OSL	OSLO	TLS	TOULOUSE BLAGNAC
OUL	OULOU FINLAND	TRD	TRONDHEIM
PAD	PADERBORN	TRN	TURIN CASALE
PAR	PARIS	TXL	BERLIN TEGEL
PIK	PRESTWICK	VCE	VENICE
PMI	PALMA - MALLORCA	VIE	VIENNA
PMO	PALERMO	VLC	VALENCIA
PUF	PAU	VRN	VERONA
RHO	RHODES		

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